

CHAPTER THREE

BIODIVERSITY

3.1 Introduction

3.1.1 Biodiversity of any given area being a function of precipitation, temperature, soils, altitude etc, its distribution across the globe is quite uneven. For instance, terrestrial biodiversity is as much as 25 times higher than marine biodiversity. Within the terrestrial habitats, tropics are found to support much richer biodiversity than alpine or polar regions. India is considered very rich in biodiversity. It is estimated that about 1/6th plant species of entire world belong to India. An area with a high concentration of endemic species is called a "hotspot". Out of the twelve hotspots of the world, two (North East and Western Ghat areas) are in India.

3.1.2. Biodiversity conservation efforts have many facets – scientific surveys, policy reforms, legislative initiatives, international co-operation, public participation etc. National agencies like the Forest Survey of India, Botanical Survey of India, Zoological Survey of India carry out extensive studies continuously to assess the extent of diversity and the change trends across habitats, flora and fauna. The country has enacted a number of legislations which have direct impact on biodiversity conservation efforts like the Indian Forest Act 1927, the Wildlife Protection Act 1972, the Forest (Conservation) Act 1980, the Environmental Protection Act 1988 and The *Biological Diversity Act 2002* being the most important among them. By amending the Constitution, protection of forests and wildlife has been made one of the Fundamental Duties. Because of being incorporated in the Concurrent List, Forests and Wildlife has been accorded a national perspective in policy making and legislation. India is signatory and zres and climatic situations have formed ecological habitats like forests, grasslands, wetlands, coastal and marine ecosystems and desert ecosystems, which harbour and sustain immense biodiversity and contribute to human well-being.

3.1.3. The enormity and intensity of these efforts notwithstanding, there is hardly any room for complacency. Increase in population, urbanization, industrialization etc are often at the cost of destruction of habitats. The forces of development and that of conservation apparently bear adversarial relationships although this true only in the short term and both have commonalities in the long term. Rapid development at the cost of environmental degradation is doomed to be unsustainable. The country is endeavoring to balance the two.

3.1.4 Preventing a loss of biodiversity is important for mankind, given that humans depend on the natural richness of the planet for the food, energy, raw materials, clean air and clean water that make life possible and drive economies and societies. As such, a reduction or loss of biodiversity may not only undermine the natural environment but also economic and social goals. The challenges associated with preserving biodiversity have made this topic an international issue.

India's major biographic zones and their area are presented in table 3.1.1

3.2 Plant Biodiversity

3.2.1 Plant biodiversity as a national and global resource is extremely valuable but is poorly understood, inadequately documented and often wasted. The preservation of biodiversity is both a matter of investment and insurance to a) sustain and improve agricultural, forestry and fisheries production, b) act as a buffer against harmful environmental changes, c) provide raw materials for scientific and industrial innovations, and d) safe guard transferring biological richness to future generations.

Table 3.1.1. India's major biogeographic zones

No.	Name	Biotic Province	Total Area (sq.km)	%
1	Trans Himalaya		174225	
		Ladakh	98618	3.3
		Tibetan Plateau	75607	2.3
2	Himalaya		210385	
		North-Western	69033	2.1
		Western	52596	1.6
		Central	6575	0.2
		Eastern	82182	2.5
3	Desert		213672	
		Kachchh	36160	1.1
		Thar	177512	5.4
4	Semi-Arid		545686	
		Central India	121629	3.7
		Gujarat-Rajputana	424057	12.9
5	Western Ghats		131491	
		Malabar coast	65745	2.0
		Western Ghat Mountains	65745	2.0
6	Deccan Peninsula		1377363	
		Deccan South Plateau	341875	10.4
		Deccan Central Plateau	410908	12.5
		Eastern Plateau	207098	6.3
		Chhota Nagpur	177512	5.4
		Central Highlands	239970	7.3
7	Gangetic Plain		355024	
		Upper Gangetic	207098	6.3
		Lower Gangetic	147927	4.5
	Coasts		82182	
8		East Coast	62458	1.9
		West Coast	19724	0.6
9	North East		170938	
		Brahmaputra Valley	65745	2.0
		North-Eastern Hills	105192	3.2
10	Island		12971	
		Andaman Islands	6575	0.2
		Nicobar Islands	3287	0.1
		Lakshadweep Islands	3110	0.1
	Marine Influenced Area:		10440	0.3
Grand Total			3287263	

Source: Wildlife Institute of India (Rodgers et al. 2002)/Zoological Survey of India

Table 3.2.1 : Number and status of plant species in India

Sl. No.	Type	No. of Known Species in the World		No. of Known Species in India		Percentage of Occurrence in India		No. of Endemic Species		No. of Threatened Species	
		2010	2013	2010	2013	2010	2013	2010	2013	2010	2013
1	2	3	4	5	6	7	8	9	10	11	12
I	Flowering Plants										
1	Gymnosperms	1021	1021	69	74	7	7.25	8.00	8	7	7
2	Angiosperms	281821	268600	17643	17926	6	6.67	ca. 5725	ca. 4045	1700	1700
II	Non-flowering Plants										
1	Bryophytes	16236	16236	2852	2504	17.56	15.42	ca. 629	629	ca.80	ca.80
2	Pteridophytes	12000	12000	1236	1265	10.3	10.54	ca.47	47	ca. 414	414
III	Others										
1	Virus & Bacteria	11813	11813	903	986	7.64	8.35	Not Known	Not Known	Not Known	Not Known
2	Algae	40000	40000	7182	7244	17.95	18.11	ca.1924	1924	Not Known	Not Known
3	Fungi	98998	98998	14588	14756	14.73	14.91	ca4100	ca.4100	ca. 580	ca.580
4	Lichens	17000	17000	2303	2390	13.55	14.06	ca.520	ca.520	Not Known	Not Known

Source : Botanical Survey of India, Kolkata.

Source : World figures are based on the Second edition of the "Numbers of Living Species in Australia and the World" (Chapman, 2009); data on the number of species in India are taken from 'Plant Discoveries 2012- New Genera, Species and New Records' compiled and edited by Paramjit Singh, D.K. Singh and S.S. Dash, published by Botanical Survey of India in 2013.

3.2.2 Biodiversity the world over is in peril because the habitats are threatened due to development programmes such as creation of reservoirs, mining, forest clearing, laying of transport and communication networks, etc. It is estimated that in the world wide perspective, slightly over 1000 animal species and sub-species are threatened with an extinction rate of one per year, while 20,000 flowering plants are thought to be at risk.

The table 3.2.2 and chart 3.2.1 depicts the enormous situation of plant species at risk. 73% of the total rare and threatened species are in the endangered category.

Table 3.2.2 : Rare and threatened species (Vascular plants)

Sl. No.	Category	Approximate Number
1	2	3
1	Rare	287
2	Vulnerable	167
3	Endangered	1366
4	Possibly Extinct	40
5	Extinct	28

Source : Botanical Survey of India, Kolkata.

CHART 3.2.1: RARE AND THREATENED SPECIES- Vascular Plants in India

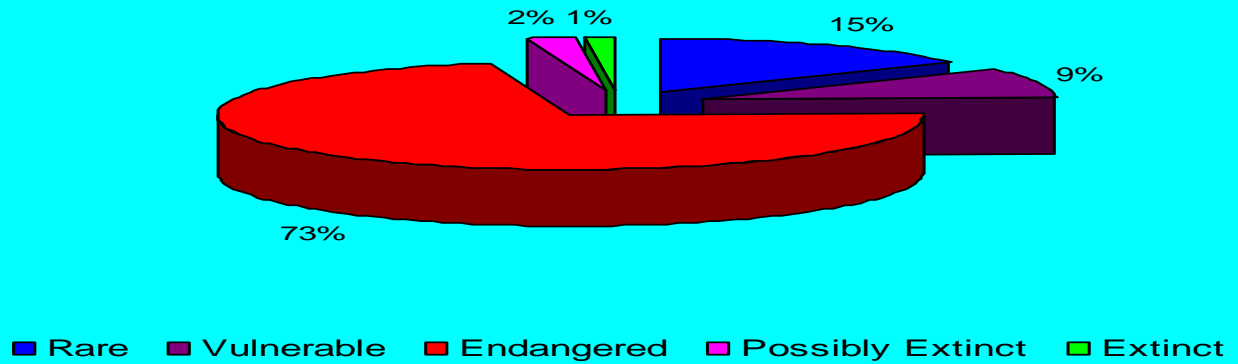


Table 3.2.3 : Threatened vascular plants

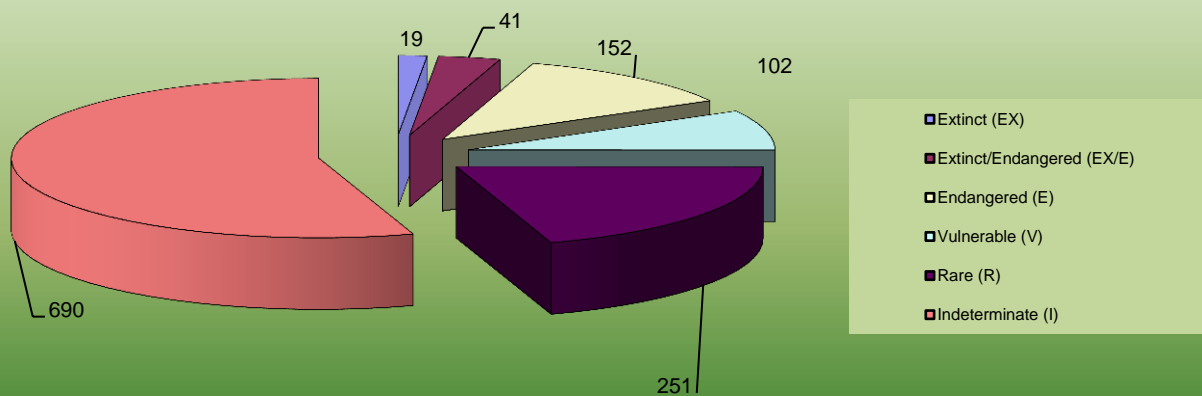
STATUS	GLOBAL	INDIA
Extinct (EX)	380	19
Extinct/Endangered (EX/E)	371	41
Endangered (E)	6522	152
Vulnerable (V)	7951	102
Rare (R)	14505	251
Indeterminate (I)	4070	690
Total under threat	33418	1236
Total number of species	242013	16000
Percentage under threat	13.8	7.7

Source : Botanical Survey of India, Kolkata.

Note : [Based on 'Red List of Threatened Vascular Plant Species in India' by C.K. Rao *et al.*, 2003 published by BSI ENVIS Centre (compiled from the 1997 IUCN Red List of Threatened Plants)]

A comparison of the India Scenario vis –a vis the global situation shows 3.7 % of the World's threatened vascular plants are in India. In India, 7.7 % of vascular plant species are under threat, while at global level, 13.8% vascular plants are in a similar position.

CHART 3.2.2: CATEGORY WISE THREAT STATUS OF VASCULAR PLANTS IN INDIA



Status Category summary by major taxonomic group of threatened plants in India is given in tables 3.2.4(a) & (b). Table 3.2.5 gives status category summary of treated plants and species at global level

Table 3.2.4 (a): Status category summary by major taxonomic group (IUCN red list version 2013.1)

CLASS*	EX	EW	CR	EN	VU	LR/ cd	NT	DD	LC	Total
ANTHOCEROTOPSIDA	0	0	0	2	0	0	0	0	0	2
BRYOPSIDA	2	0	12	13	7	0	1	3	3	41
CHAROOHYACEAE	0	0	0	0	0	0	0	3	8	11
CHLOROPHYCEAE	0	0	0	0	0	0	0	1	0	1
CONIFEROPSIDA	0	0	27	96	79	0	98	7	297	604
CYCADOPSIDA	0	4	53	65	74	0	63	3	45	307
EQUISETOPSIDA	0	0	0	0	0	0	0	0	1	1
FLORIDEOPHYCEAE	1	0	6	0	3	0	0	44	4	58
GINKGOOPSIDA	0	0	0	1	0	0	0	0	0	1
GNETOPSIDA	0	0	0	1	3	0	7	10	76	97
ISOETOPSIDA	0	0	8	4	2	0	3	6	5	28
JUNGERMANNIOPSIDA	1	0	10	12	12	0	0	0	10	45
LILIOPSIDA	3	4	253	402	525	16	194	371	1135	2903
LYCOPODIOPSIDA	0	0	1	2	8	0	1	0	1	13
MAGNOLIOPSIDA	81	21	1514	2229	4255	195	1063	855	2990	13203
MARCHANTIOPSIDA	0	0	0	4	2	0	0	4	1	11
OPHIOGLOSSOPSIDA	0	0	0	0	0	0	0	0	3	3
OSMUNDOPSIDA	0	0	0	0	0	0	0	0	1	1
POLYPODIOPSIDA	2	0	35	42	64	0	15	50	58	266
SELLAGINELLOPSIDA	0	0	0	0	1	0	1	0	2	4
SPHAGNOPSIDA	0	0	0	0	2	0	0	0	0	2
TAKAKIOPSIDA	0	0	0	0	1	0	0	0	0	1
ULVOPHYCEAE	0	0	0	0	0	0	0	1	0	1
TOTAL	90	29	1919	2873	5038	211	1446	1358	4640	17604
OTHER GROUPS										
AGARICOMYCETES	0	0	1	0	0	0	0	0	0	1
LECANOROMYCETES	0	0	1	1	0	0	0	0	0	2
PHAEOPHYCEAE	0	0	4	1	1	0	0	9	0	15
TOTAL	0	0	6	2	1	0	0	9	0	18

Source : Botanical Survey of India, Kolkata.

*Anthocerotopsida (hornworts); Bryopsida, Sphagnopsida and Takakiopsida (true mosses); Chlorophyceae and Ulvophyceae (green algae); Coniferopsida (conifers); Cycadopsida (cycads); Florideophyceae (red algae); Ginkgoopsida (ginkgo); Isoetopsida (quillworts); Jungermanniopsida and Marchantiopsida (liverworts); Liliopsida (monocotyledons); Lycopodiopsida (club mosses); Magnoliopsida (dicotyledons); Ophioglossopsida, Osmundopsida and Polypodiopsida (true ferns); Sellaginellopsida (spike mosses).

Sellaginellopsida (spike mosses).

Other groups: Agaricomycetes (mushroom, etc.); Lecanoromycetes (discolichens); Phaeophyceae (brown algae).

EX - Extinct

EW - Extinct in the Wild

CR - Critically Endangered

EN - Endangered

VU - Vulnerable

LR/cd - Lower Risk/conservation dependent

NT - Near Threatened

DD - Data Deficient

LC - Least Concern (includes **LR/lc** - Lower Risk, Least Concern).

Table 3.2.4 (b): Status category summary by major taxonomic group (IUCN red list version 2013.2)

CLASS*	EX	EW	CR	EN	VU	LR/ cd	NT	DD	LC	Total
ANTHOCEROTOPSIDA	0	0	0	2	0	0	0	0	0	2
BRYOPSIDA	2	0	12	13	7	0	1	3	3	41
CHAROOHYACEAE	0	0	0	0	0	0	0	3	8	11
CHLOROPHYCEAE	0	0	53	0	0	0	0	1	0	54
CYCADOPSIDA	0	4	0	65	74	0	63	3	45	254
EQUISETOPSIDA	0	0	6	0	0	0	0	0	1	7
FLORIDEOPHYCEAE	1	0	0	0	3	0	0	44	4	52
GINKGOOPSIDA	0	0	0	1	0	0	0	0	76	77
GNETOPSIDA	0	0	8	1	3	0	7	10	5	34
ISOETOPSIDA	0	0	10	4	2	0	3	6	10	35
JUNGERMANNIOPSIDA	1	0	273	11	12	0	1	0	1428	1726
LILIOPSIDA	3	4	1	468	551	16	215	396	4	1658
LYCOPODIOPSIDA	0	0	1527	2	9	0	3	0	3062	4603
MAGNOLIOPSIDA	81	21	1	2285	4290	195	1077	874	0	8824
MARCHANTIOPSIDA	0	0	1	0	0	0	0	0	1	2
OPHIOGLOSSOPSIDA	0	0	27	3	2	0	0	4	298	334
OSMUNDOPSIDA	0	0	38	96	79	0	98	7	63	381
POLYPODIOPSIDA	2	0	0	55	67	0	15	50	3	192
SELLAGINELLOPSIDA	0	0	0	0	0	0	0	0	0	0
SPHAGNOPSIDA	0	0	0	0	2	0	0	0	0	2
TAKAKIOPSIDA	0	0	0	0	1	0	0	0	0	1
ULVOPHYCEAE	0	0	0	0	0	0	0	1	0	1
TOTAL	90	29	1957	3006	5102	211	1483	1402	5011	18291
OTHER GROUPS										
AGARICOMYCETES	0	0	1	0	0	0	0	0	0	1
LECANOROMYCETES	0	0	1	1	0	0	0	0	0	2
PHAEOPHYCEAE	0	0	4	1	1	0	0	9	0	15
TOTAL	0	0	6	2	1	0	0	9	0	18

Source : Botanical Survey of India, Kolkata.

*Plants: Anthocerotopsida (hornworts); Bryopsida, Sphagnopsida and Takakiopsida (true mosses); Charophyceae, Chlorophyceae and Ulvophyceae (green algae); Cycadopsida (cycads); Equisetopsida (horsetails); Florideophyceae (red algae); Ginkgoopsida (ginkgo); Gnetopsida (gnetums); Isoetopsida (quillworts); Jungermanniopsida and Marchantiopsida (liverworts); Liliopsida (monocotyledons); Lycopodiopsida (club mosses and spike mosses); Magnoliopsida (dicotyledons); Marattiopsida, Polypodiopsida and (ferns); Pinopsida (conifers).

Sellaginellopsida (spike mosses).

Other groups: Agaricomycetes (mushroom, etc.); Lecanoromyctes (discolichens); Phaeophyceae (brown algae).

EX - Extinct

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Table 3.2.5: Status category summary at global level

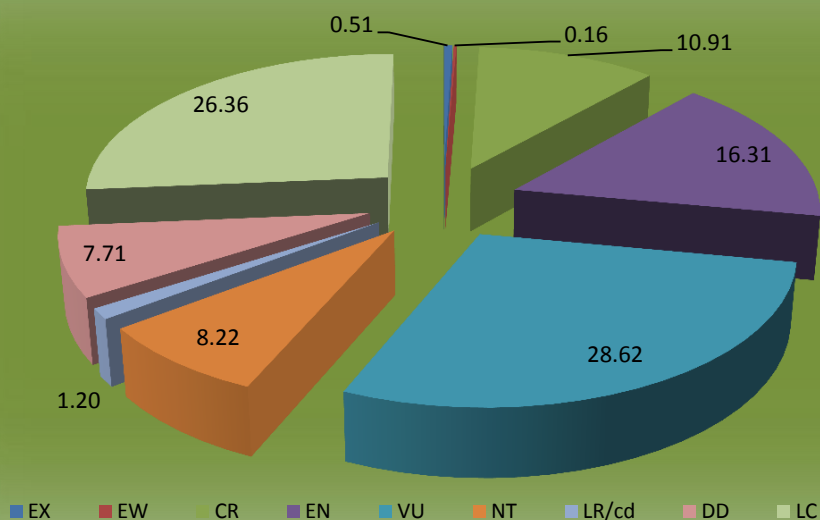
STATUS	IUCN Red List version 2010	IUCN Red List version 2011.1	IUCN Red List version 2011.2	IUCN Red List version 2011.3
Extinct	86	87	91	90
Extinct in the Wild	28	31	31	29
Critically Endangered	1581	1716	1752	1920
Endangered,	2318	2528	2572	2871
Vulnerable,	4605	4854	4869	5038
Near Threatened (includes LR/nt - Lower Risk/near threatened)	1077	1230	1246	1447
Lower Risk/conservation dependent,	237	225	224	211
Data Deficient,	744	1011	1070	1358
Least Concern (includes LR/lc - Lower Risk, least concern).	1531	2507	2727	4640
TOTAL	12207	14189	14582	17604

Source : Botanical Survey of India, Kolkata.

Note : IUCN Red List Categories:

As evident from Chart 3.2.3, at global level, nearly 0.51% of the plant species are extinct, 10.91% critically endangered and 28.62% are in a vulnerable state.

Status category summary of Threatened plants at global level



3.3 Conservation Measures of Agro Biodiversity

3.3.1 There is a pressing need for the conservation of plant species. But it is largely impractical to conserve the very large number of crop species and their wild relatives in their natural habitats. National parks, seed banks etc are initiatives in this direction.

The details of total holdings collections and specimens of flora in India are shown at table 3.3.1.

Table 3.3.1 : Reference collections of flora			
Sl. No.	Category	Total Number	Total Holdings of Collections and Specimens
1	2	3	4
1	Herbarium	65*	5594795
2	Museums	19	60500

Source : Botanical Survey of India, Kolkata.

* Index Herbariorum online

3.3.2 The National Bureau of Plant Genetic Resources (NBGR) established in 1976 as an institution under Indian Council of Agricultural Research (ICAR) emerged as an important organization dealing with various establishments of plant genetic resources. The organization is entrusted with the vital responsibility of germ plasm, exchange with appropriate quarantine measures, survey exploration, their organization, planning and coordination, comprising evaluation, documentation and conservation of diverse plant genetic resources. The National Gene Bank has also been established within the complex. Within the new trade related intellectual property rights (TRIPS) within World Trade Organisation related agreements, documentation of our genetic resources is very important.



Tables 3.3.2 to 3.3.5 present the various conservation measures for plants in India

Table 3.3.2 : Status of Ex-Situ conservation (base collection) of orthodox seeds at - 180 °C

(As on 30 st November, 2010)				(as on 31st March 2012)
Sl. No.	Crop Group	Species	Accessions*	Accessions**
1	2	3	4	5
1	Cereals	90	150223	153183
2	Milletts & Forages	178	55290	56067
3	Pseudo Cereals	30	6657	6785
4	Grain Legumes	69	57246	57744
5	Oilseeds	58	55803	56487
6	Fibre Crops	51	11535	11848
7	Vegetables	151	24377	24870
8	Fruits	35	530	530
9	Medicinal & Aromatic Plants & Narcotics	660	6404	6690
10	Spices & Condiments	17	2894	3212
11	Agro-Forestry	244	2442	2442
12	Duplicate Safety Samples	-	10235	10235
Total		1583	383636	390092

Source : National Bureau of Plant Genetic Resources

* : The figure includes 3777 released varieties and 2024 genetic stocks
No. of crop species conserved - 1583

** The figure includes 4074 released varieties and 2178 genetic stocks
No. of crop species conserved - 1584

Table 3.3.3 : Status of in-vitro conservation*(As on 31st March 2012)*

Crop group	Genera	Species	Cultures*	Accessions (no.)
	(no.)	(no.)	(no.)	
1	2	3	4	5
Tropical Fruits (banana, grape)	2	14	7600	416
Temperate and Minor Fruits (mulberry, strawberry, apple,pear,blackberry)	9	41	6140	327
Tuber crops (sweet potato, yam, taro)	5	12	9200	611
Bulbous and other crops (garlic, gladiolus)	4	12	3300	171
Medicinal and Aromatic Plants (species of bacopa, mentha, rauwolfia, tylophora)	21	28	4980	170
Spices and Industrial crops (ginger, turmeric, pepper, cardamom, hops, jojoba)	7	27	5880	380
Total	48	134	37100	2075

Source : National Bureau of Plant Genetic Resources, New Delhi

* data is for 2010

Table 3.3.4 : Status of cryopreservation of dormant buds & pollen grains

(As on 31st December, 2010)

Dormant Buds	337
Pollen grains	345
Wild Relatives*	997
Rare & Endangered plants	80
Varieties*	654
Elite*	4
Registered germplasm*	22
Number of Species	729

Source : National Bureau of Plant Genetic Resources

* included in respective Categories stored as orthodox seeds.

Table 3.3.5 : Status of germplasm at national cryobank

Sl. No.	Category	No. of Accessions	
		2010 (As on 31st October)	2012 (As on 31st March)
1	2	3	4
I	Intermediate & Recalcitrant		
1	Fruits & Nuts	2618	2831
2	Spices & Condiments	148	151
3	Plantation Crops	22	22
4	Agroforestry & Forestry species	1640	1640
5	Industrial crops	1256	1325
6	Medicinal & Aromatic Plants	5	-
II	Orthodox		
1	Cereals	240	240
2	Milletts and Forages	287	287
3	Pseudocereals	76	76
4	Grain Legumes	636	636
5	Oilseeds	471	471
6	Fibres	66	66
7	Vegetables	433	433
8	Medicinal & Aromatic Plants	849	923
9	Narcotics & dyes	34	34
10	Miscellaneous	16	16
Total		8797	9151

Source : National Bureau of Plant Genetic Resources

There are 131 Botanical gardens in India exhibiting and protecting the Plant diversity of India.

3.4 Forest and Trees in India

3.4.1 Though more than one-fifth of India's geographic area is recorded as forest area, it is not known with certainty how much forest area actually bears forest cover. The National Forest Policy (1952 and 1988) aims at having one third of country's land area under forest and tree cover. India has 76.95 million hectares of recorded forest area in March 2007. This accounts for 23.41% of total geographic area. Per capita availability of forests in India is 0.06 ha which is much lower than the world average of 0.8 ha.

Table 3.3.6 : Conservation measures (in India)

Sl. No.	Category	Number	Total Geographical Area (Sq. Km.)
1	2	3	4
I	Within Habitats (in situ)		
1	Biosphere Reserves***	18	89,149.99
2	Conservation Reserves**	57	2,017.94
3	Community Reserves**	4	20.69
4	National Parks**	102	40,074.78
5	Wildlife Sanctuaries**	520	122,867.34
6	Reserve Forests+	NA	422,536
7	Protected Forests+	NA	213,982
8	Unclassed Forests+	NA	133,020
II	Outside Habitats (ex situ)		
1	Botanical Gardens*	131	NA
2	Gene Banks	NA	NA

Source : Botanical Survey of India, Kolkata.

+ Source: FSI State of Forest Report, 2011

*** Source: Ministry of Environment & Forest Annual Report, 2012-13

** National Wildlife Database of Wildlife Institute of India

* BGCI Website

Note: Besides, there are 41 Tiger Reserves, 28 Elephant Reserves, 26 Ramsar Wetland Sites and 6 World Natural Heritage Sites in India (Source: MoEF Annual Report 2012-13). India has a rich heritage of species and genetic strains of flora. Overall about six percent of world species are found in India. It is estimated that India is one of the seventeen mega-diversity (eleventh among these in respect to number of endemic vascular plant species*) and tenth among the plant rich countries of the world as well as sixth among the centers of diversity and origin of agro-diversity. Out of the total thirty four biodiversity hot-spots in the world, India has four, viz. Himalaya, Indo-Burma, Western Ghats and Sri Lanka, and Sundaland (www.biodiversityhotspots.org). The growing urbanization and industrialization causes the decrease of Natural habitats, which further results in the loss to biological diversity. Biodiversity, once lost cannot be recovered.

Table 3.4.1 : Recorded forest area in States and UT's

(Sq.km)

Sl. No.	State/UT	Geographic Area	Recorded Forest Area				Percentage of Forest to Geo. Area
			Reserved Forests	Protected Forests	Unclassed Forests	Total Forest Area	
1	2	3	4	5	6	7	8
1	Andhra Pradesh	275069	50479	12365	970	63814	23.20
2	Arunachal Pradesh	83743	10546	9528	31466	51540	61.55
3	Assam	78438	17864	0	8968	26832	34.21
4	Bihar	94163	693	5779	1	6473	6.87
5	Chhattisgarh	135191	25782	24036	9954	59772	44.21
6	Delhi	1483	78	7	-	85	5.73
7	Goa	3702	253	845	126	1224	33.06
8	Gujarat	196022	14122	479	4326	18927	9.66
9	Haryana	44212	249	1158	152	1559	3.53
10	Himachal Pradesh	55673	1898	33130	2005	37033	66.52
11	Jammu & Kashmir	222236	17643	2551	36	20230	9.10
12	Jharkhand	79714	4387	19185	33	23605	29.61
13	Karnataka	191791	28690	3931	5663	38284	19.96
14	Kerala	38863	11123	142	-	11265	28.99
15	Madhya Pradesh	308245	61886	31098	1705	94689	30.72
16	Maharashtra	307713	49226	8195	4518	61939	20.13
17	Manipur	22327	1467	4171	11780	17418	78.01
18	Meghalaya	22429	1113	12	8371	9496	42.34
19	Mizoram	21081	7909	3568	5240	16717	79.30
20	Nagaland	16579	86	508	8628	9222	55.62
21	Odisha	155707	26329	15525	16282	58136	37.34
22	Punjab	50362	44	1137	1903	3084	6.12
23	Rajasthan	342239	12454	17416	2769	32639	9.54
24	Sikkim	7096	5452	389	-	5841	82.31
25	Tamil Nadu	130058	19388	2183	1306	22877	17.59
26	Tripura	10486	4175	2	2117	6294	60.02
27	Uttar Pradesh	240928	11660	1420	3503	16583	6.88
28	Uttarakhand	53483	24643	9885	123	34651	64.79
29	West Bengal	88752	7054	3772	1053	11879	13.38
30	Union Territories	9478	5843	1565	22	7430	78.39
Total		3287263	422536	213982	133020	769538	23.41

State of Forest Report 2011

Forest Cover of India-2011

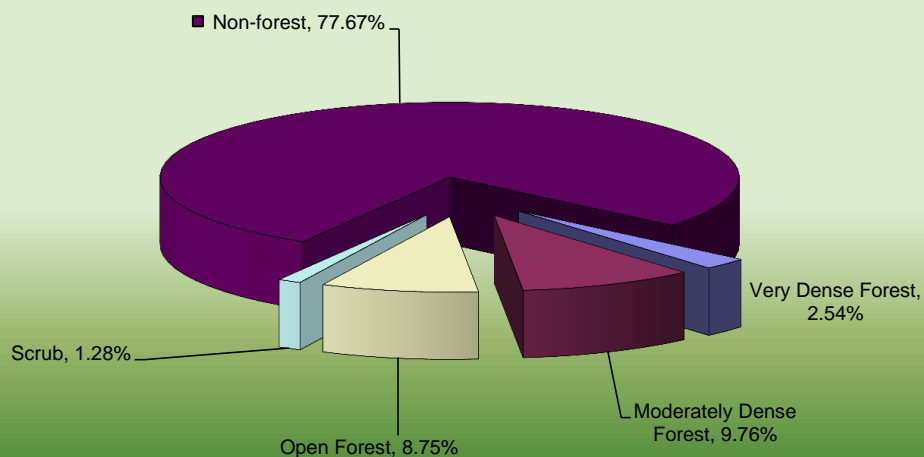


Table 3.4.2 : Forest area by ownership(during 2005-06)

(Sq.km)

Sl. No.	State/ Union Territory	Forest Department					Others		
		Reserved	Protected	Unclassified	Total	Area Under Sanctioned Working Plans	Revenue Department Forests	Corporate Bodies Forest/ Community Ownership	Private Forest
1	2	3	4	5	6	7	8	9	10
1	A&N Islands								
2	Andhra Pradesh	50478.63	12365.34	969.76	63813.73	63813.73	0.00	0.00	0.00
3	Arunachal Pradesh	10537.94	9535.79	31466.27	51540.00	15699.24	0.00	0.00	0.00
4	Assam	13870.00	3925.00	5865.00	23660.00	13870.00	0.00	0.00	0.00
5	Bihar								
6	Chandigarh								
7	Chhattisgarh	25782.17	24036.10	9954.13	59772.40	0.00	NA	NA	NA
8	Dadra & Nagar Haveli	198.76	4.82	0.00	203.58	198.76	0.00	0.00	0.00
9	Daman & Diu								
10	Delhi								
11	Goa								
12	Gujarat	14122.20	375.67	4426.65	18924.52	15497.76	NA	NA	NA
13	Haryana	249.07	1158.17	18.96	1426.20	1463.12	-	-	132.75
14	Himachal Pradesh	1896.00	33043.00	2094.00	37033.00	24909.00	NA	NA	NA
15	Jammu & Kashmir	20194.00	36.00	NA	20230.00	20230.00	NA	NA	NA
16	Jharkhand								
17	Karnataka								
18	Kerala								
19	Lakshadweep								
20	Madhya Pradesh	61886.00	31098.00	1704.00	94689.00	NA	NA	0.00	NA
21	Maharashtra	44476.00	7992.00	3459.00	55927.00	50590.00	2449.00	3563.00	NA
22	Manipur								
23	Meghalaya	712.74	12.39	399.48	1124.61	0.00	0.00	0.00	0.00
24	Mizoram	1657.28	2126.95	5834.44	9618.67	0.00	0.00	0.00	0.00
25	Nagaland	85.83	513.55	191.62	791.00	0.00	0.00	0.00	7621.07
26	Odisha	26329.12	15525.22	20.55	41874.89	877.81	16261.34	0.00	12.29
27	pondicherry								
28	Punjab	436.33	114929.96	19019.03	138285.32	305533.96	0.00	0.00	167320.07
29	Rajasthan	12801.32	17020.94	2805.68	32627.94	4710.18	NA	NA	NA
30	Sikkim								
31	Tamil Nadu								
32	Tripura	3588.18	589.23	2116.87	6294.29	1427.83	0.00	0.00	0.00
33	Uttar Pradesh	11609.00	1434.00	3411.00	16454.00	NA	-	72.65	14.31
34	Uttaranchal	24261.56	98.61	53.01	24413.19	0.00	4768.70	5449.64	158.69
35	West Bengal	7054.00	3772.00	1053.00	11879.00	395.29	0.00	0.00	0.00

Source : Indian Council of Forestry Research and Education

Note: Blank cell indicates information is not available

Table 3.4.3 presents the State/ UT wise details of forest area by composition (Coniferous forest, non- coniferous forest, mixed).

Table 3.4.2 : Forest area by ownership (during 2005-06)

(sq.km)

Sl. No.	State/ Union Territory	Coniferous forest			Non-coniferous Forest				Coniferous & Non- coniferus	Total
		Chir	Deodar	Others Conifers	Sal	Teak	Mangro ve	Others		
1	2	3	4	5	6	7	8	9	10	11
1	A & N Islands									
2	Andhra Pradesh	0.00	0.00	0.00	47.16	9145.00	0.00	54621.57	0.00	63813.73
3	Arunachal Pradesh	243.00	NA	35.30	0.00	0.00	0.00	47767.00	0.00	51540.00
4	Assam	0.00	0.00	0.00	529.00	0.00	NA	NA	NA	529.00
5	Bihar									
6	Chandigarh									
7	Chhattisgarh	0.00	0.00	0.00	24244.88	5633.13	0.00	29894.39	0.00	59772.40
8	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	203.58	0.00	203.58
9	Daman & Diu									
10	Delhi									
11	Goa									
12	Gujarat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Haryana									
14	Himachal Pradesh	1364.00	1310.00	6328.00	190.00	0.00	0.00	7178.00	20663.00	37033.00
15	Jammu & Kashmir	1825.00	1075.00	5368.00	0.00	0.00	0.00	1885.00	10075.00	20230.00
16	Jharkhand									
17	Karnataka									
18	Kerala									
19	Lakshadweep									
20	Madhya Pradesh	0.00	0.00	0.00	NA	NA	NA	NA	0.00	94689.00
21	Maharashtra	0.00	0.00	0.00	0.00	10002.00	116.00	45809.00	0.00	55927.00
22	Manipur									
23	Meghalaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
24	Mizoram	0.00	0.00	0.00	0.00	150.00	0.00	3036.75	21.30	3208.05
25	Nagaland					0.00	0.00	0.00	0.00	
26	Odisha	0.00	0.00	0.00	16938.25	2030.64	203.00	38974.72	0.00	58146.61
27	Pondicherry									
28	Punjab	0.00	0.00	1090.25	0.00	0.00	0.00	3045150.14	305605.00	305605.39
29	Rajasthan	-	-	-	-	942.24	-	31685.70	-	32627.94
30	Sikkim									
31	Tamil Nadu									
32	Tripura	0.00	0.00	0.00	271.90	1567.51	0.00	4454.80	0.00	6294.29
33	Uttar Pradesh	-	-	-	173764.00	25967.00	-	1116698.00	-	1645406.00
34	Uttaranchal	3993.30	192.65	1205.87	3151.13	200.93	0.00	3420.24	12249.07	24413.19
35	West Bengal	-	-	89.00	-	-	1909.00	-	9881.00	11879.00

Source : Indian Council of Forestry Research and Education

Note: Blank cell indicates information is not available

Nonresponding States A & N Island, Assam, Bihar, Delhi, Manipur, Mizoram and Nagaland.

3.4.4 As per the latest State of Forest Report 2011, the forest cover in the country is 692,029 kmsq. and constitutes 21.05 % of its geographic area.

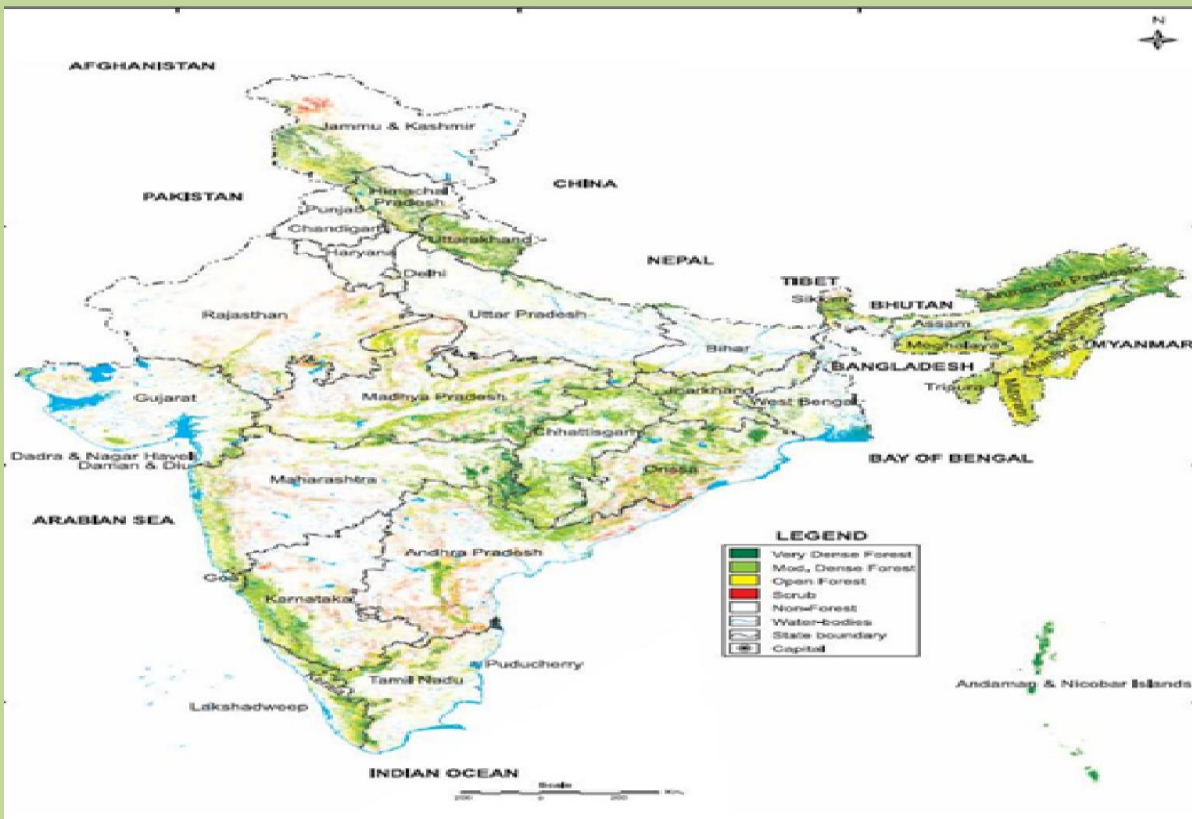
Table 3.4.4 : Forest cover in India 2011

Class	Area (Sq. Km)	Percentage of Geographic Area
1	2	3
Forest Cover		
Very Dense Forest	83471	2.54
Moderately Dense Forest	320736	9.76
Open Forest	287820	8.75
Total Forest Cover*	692027	21.05
Non-Forest Cover		
Scrub	42176	1.28
Non-forest	2553060	77.67
Total Geographic Area	3287263	100

Source : India State of Forest Report 2011

* Includes 4662 Sq km area under mangroves

3.4.5 In India, 40.79 % of the total forest area is in the hill districts and this covers 39.82% of the total geographic area of the hill districts. **The table 3.4.6 depicts the details of State / UT wise Forest Cover in Hill Districts of India.** It is pertinent to mention that, in India, 59.72 % of the total forest area is in tribal districts and covers 37.32% of total geographic area of tribal districts. **The table 3.4.7 depicts the details of State / UT wise Forest Cover in Tribal Districts of India.**



3.4.5 State /UT wise Forest area covered and its percentage to total geographic area are presented in table 3.4.5.

Table 3.4.5: Forest cover in states/Uts in India - 2011

(Area in Sq. km)

Sl. No.	State/UT	Geographic Area	Forest Cover Area				Percent of G.A.	Scrub
			Very Dense Forest	Moderate Dense Forest	Open Forest	Total Forest		
1	2	3	4	5	6	7	8	
1	Andhra Pradesh	275069	850	26242	19297	46389	16.86	10372
2	Arunachal Pradesh	83743	20868	31519	15023	67410	80.50	111
3	Assam	78438	1444	11404	14825	27673	35.28	179
4	Bihar	94163	231	3280	3334	6845	7.27	134
5	Chhattisgarh	135191	4163	34911	16600	55674	41.18	107
6	Delhi	1483	7	50	120	177	11.94	1
7	Goa	3702	543	585	1091	2219	59.94	1
8	Gujarat	196022	376	5231	9012	14619	7.46	1463
9	Haryana	44212	27	457	1124	1608	3.64	145
10	Himachal Pradesh	55673	3224	6381	5074	14679	26.37	327
11	Jammu & Kashmir	222236	4140	8760	9639	22539	10.14	2036
12	Jharkhand	79714	2590	9917	10470	22977	28.82	683
13	Karnataka	191791	1777	20179	14238	36194	18.87	3176
14	Kerala	38863	1442	9394	6464	17300	44.52	58
15	Madhya Pradesh	308245	6640	34986	36074	77700	25.21	6401
16	Maharashtra	307713	8736	20815	21095	50646	16.46	4157
17	Manipur	22327	730	6151	10209	17090	76.54	1
18	Meghalaya	22429	433	9775	7067	17275	77.02	211
19	Mizoram	21081	134	6086	12897	19117	90.68	1
20	Nagaland	16579	1293	4931	7094	13318	80.33	2
21	Odisha	155707	7060	21366	20477	48903	31.41	4852
22	Punjab	50362	0	736	1028	1764	3.50	20
23	Rajasthan	342239	72	4448	11567	16087	4.70	4347
24	Sikkim	7096	500	2161	698	3359	47.34	356
25	Tamil Nadu	130058	2948	10321	10356	23625	18.16	1206
26	Tripura	10486	109	4686	3182	7977	76.07	75
27	Uttar Pradesh	240928	1626	4559	8153	14338	5.95	745
28	Uttarakhand	53483	4762	14167	5567	24496	45.80	271
29	West Bengal	88752	2984	4646	5365	12995	14.64	29
30	A. & N. Islands	8249	3761	2416	547	6724	81.51	53
31	Chandigarh	114	1	10	6	17	14.91	1
32	Dadra & Nagar Haveli	491	0	114	97	211	42.97	1
33	Daman & Diu	112	0	1	6	7	6.25	3
34	Lakshadweep	32	0	17	10	27	84.38	0
35	Puducherry	480	0	35	15	50	10.42	0
	Total	3287263	83471	320737	287821	692029	21.05	41525

Source: India State of Forest Report 2011

Table 3.4.6 : State/UT wise forest cover in hill districts-2011

Sl. No.	Name of State/UT	Number of Hill Districts	Geographic Area	Forest Cover Area				Percent Forest Cover
				Very Dense Forest	Moderately Dense Forest	Open Forest	Total (2011)	
				5	6	7	10	
1	2	3	4	5	6	7	10	11
1	Arunachal Pradesh	13	83743	20868	31519	15023	67410	80.50
2	Assam	3	19153	741	5725	6519	12985	67.80
3	Himachal Pradesh	12	55673	3224	6381	5074	14679	26.37
4	Jammu & Kashmir (a)	14	101388	2814	6269	6953	16036	15.82
	(b)	*	120848	1326	2471	2686	6483	5.36
5	Karnataka	6	48046	1492	14920	6788	23200	48.29
6	Kerala	10	29572	1105	7305	5277	13687	46.28
7	Maharashtra	7	69905	318	7237	7947	15502	22.18
8	Manipur	9	22327	730	6151	10209	17090	76.54
9	Meghalaya	7	22429	433	9775	7067	17275	77.02
10	Mizoram	8	21081	134	6086	12897	19117	90.68
11	Nagaland	8	16579	1293	4931	7094	13318	80.33
12	Sikkim	4	7096	500	2161	698	3359	47.34
13	Tamil Nadu	5	22789	962	3370	2040	6372	27.96
14	Tripura	4	10486	111	4686	3182	7979	76.95
15	Uttaranchal	13	53483	4762	14167	5567	24496	45.80
16	West Bengal	1	3149	714	663	912	2289	72.69
Total		124	707747	41527	133817	105933	281277	39.74

Source:India State of Forest Report, 2011

* : Refers to area outside LOC i.e. under illegal occupation of Pakistan and China.

Table 3.4.7: State/UT wise forest cover in tribal districts - 2011

Sl. No.	State/UT	Number of Tribal Districts	Geographic Area	Forest Cover				Percent Forest Cover
				Very Dense Forest	Moderately Dense Forest	Open Forest	Total	
				5	6	7	10	
1	2	3	4	5	6	7	10	11
1	Andhra Pradesh	8	87090	239	16613	8449	25301	29.05
2	Arunachal Pradesh	13	83743	20868	31519	15023	67410	80.50
3	Assam	16	50137	648	4599	6749	11996	23.93
4	Chhattisgarh	9	92656	3614	24477	11966	40057	43.23
5	Gujarat	8	48409	322	2944	3500	6766	13.98
6	Himachal Pradesh	3	26764	950	1067	1214	3231	12.07
7	Jharkhand	8	44413	1677	6067	6218	13962	31.44
8	Karnataka	5	26597	1248	7642	4249	13139	49.02
9	Kerala	9	27228	1073	7017	5006	13039	47.89
10	Madhya Pradesh	18	139448	5639	20275	16387	42301	30.33
11	Maharashtra	11	138272	7275	11389	10848	29512	21.34
12	Manipur	9	22327	730	6151	10209	17090	76.54
13	Meghalaya	7	22429	433	9775	7067	17275	77.02
14	Mizoram	8	21081	134	6086	12897	19117	90.68
15	Nagaland	8	16579	1293	4931	7094	13318	80.33
16	Odisha	12	86124	5268	14442	13588	33298	38.66
17	Rajasthan	5	38218	0	2442	3907	6349	16.61
18	Sikkim	4	7096	500	2161	698	3359	47.34
19	Tamil Nadu	6	30720	697	2392	3653	6742	21.95
20	Tripura	4	10486	109	4686	3182	7977	76.95
21	Uttar Pradesh	1	7680	409	475	435	1319	17.17
22	West Bengal	11	69403	2962	4475	4863	12300	17.72
23	Andaman & Nicobar	2	8249	3761	2416	547	6724	81.51
24	Dadra & Nagar Haveli	1	491	0	114	97	211	42.97
25	Daman & Diu	1	72	0	1	3	4	5.56
26	Lakshadweep	1	32	0	17	10	27	84.38
Total		188	1105744	59849	194173	157859	411881	37.25

Source:India State of Forest Report 2011

Table 3.4.8 : State/UT wise forest area (1987-2011)

Sl. No.	State/UT	Total Forest Area in Sq.Km												
		1987	1988	1989	1991	1995	1997	1999	2001	2003	2005	2007	2009	2011
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Andhra Pradesh	63771	63771	63771	63726	63814	63814	63814	63814	63821	63821	63814	63814	63814
2	Arunachal Pradesh	51540	51540	51540	51540	51540	51540	51540	51540	51540	51540	51540	51540	51540
3	Assam	30708	30708	30708	30708	30708	30708	30708	27018	27018	26832	26832	26832	26832
4	Bihar	29230	29230	29230	29226	29226	29226	29226	6078	6473	6473	6473	6473	6473
5	Chhattisgarh								59285	59772	59772	59772	59772	59772
6	Delhi	42		42	42	42	42	85	85	85	85	85	85	85
7	Goa	1053	1053	1053	1256	1424	1424	1424	1224	1224	1224	1224	1224	1224
8	Gujarat	18777	18777	18777	19388	19393	19393	19393	18999	19113	18962	18927	18927	18927
9	Haryana	1685	1685	1685	1687	1673	1673	1673	1551	1558	1559	1559	1559	1559
10	Himachal Pradesh	21325	21325	21325	37591	35407	35407	35407	37033	37033	37033	37033	37033	37033
11	Jammu & Kashmir	20892	20892	20892	20174	20182	20182	20182	20230	20230	20230	20230	20230	20230
12	Jharkhand								23605	23605	23605	23605	23605	23605
13	Karnataka	38644	38644	38644	38646	38724	38724	38724	38724	43084	38284	38284	38284	38284
14	Kerala	11222	11222	11222	11222	11221	11221	11221	11221	11268	11265	11265	11265	11265
15	Madhya Pradesh	155414	155414	155414	155414	154497	154497	154497	95221	95221	94689	94689	94689	94689
16	Maharashtra	64055	64055	64055	63861	63842	63842	63842	61939	61939	61939	61939	61939	61939
17	Manipur	15155	15155	15155	15154	15154	15154	15154	17418	17418	17418	17418	17418	17418
18	Meghalaya	8514	8514	8514	9496	9496	9496	9496	9496	9496	9496	9496	9496	9496
19	Mizoram	15935	15935	15935	15935	15935	15935	15935	15935	16717	16717	16717	16717	16717
20	Nagaland	8625	8625	8625	8625	8629	8629	8629	8629	8629	9222	9222	9222	9222
21	Odisha	59555	59555	59555	59555	57184	57184	57184	58135	58136	58136	58136	58136	58136
22	Punjab	2803	2803	2803	2842	2901	2901	2901	3059	3084	3084	3084	3058	3084
23	Rajasthan	31151	31151	31151	31559	31700	31700	31700	32494	32488	32488	32639	32639	32639
24	Sikkim	2650	2650	2650	2650	2650	2650	2650	5765	5841	5841	5841	5841	5841
25	Tamil Nadu	22319	22319	22319	22699	22628	22628	22628	22871	22877	22877	22877	22877	22877
26	Tripura	6280	6280	6280	6292	6293	6293	6293	6293	6294	6294	6294	6294	6294
27	Uttar Pradesh	51269	51269	51269	51502	51663	51663	51663	16826	16826	16796	16583	16583	16583
28	Uttarakhand								34662	34662	34651	34651	34651	34651
29	West Bengal	11879	11879	11879	11879	11879	11879	11879	11879	11879	11879	11879	11879	11879
30	A & N Islands	7144	7144	7144	7171	7171	7171	7171	7171	7171	7171	7171	7171	7171
31	Chandigarh	6	6	6	31	31	31	31	32	34	33	34	34	34
32	Dadra and Nagar Haveli	203	203	203	207	203	203	203	203	204	204	204	204	204
33	Daman & Diu	*	*	*	*	*	NA	0.7	1	1	6	8	8	8
34	Lakshadweep	nil	nil	nil	nil	nil	NA	0	0	0	0	0	0	0
35	Puducherry	nil	nil	nil	nil	nil	NA	0	0	0	0	13	13	13
	Total	751846	751346	751846	770078	765210	765210	765253	768436	774740	769626	769538	769512	769538

Source: Ministry of Environment & Forests

* Included in Goa

3.5 Changes in coverage of Forests, Trees and Mangroves

3.5.1 Multi-pronged pressures on forests come from population, cattle grazing, fuel and fodder collection, industry and forest fires, etc. The changes forest cover between 2009-2011 state wise is given in table 3.5.1.

Table 3.5.1 : Change in forest cover of states/UTs between 2009 and 2011

State/UT	Geographical Area	2009				2011				Change			
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest	Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest	VDF	MDF	Open	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Andhra Pradesh	275069	850	26377	19443	46670	850	26242	19297	46389	0	-135	-146	-281
Arunachal Pradesh	83743	20873	31574	15037	67484	20868	31519	15023	67410	-5	-55	-14	-74
Assam	78438	1461	11558	14673	27692	1444	11404	14825	27673	-17	-154	152	-19
Bihar	94163	231	3248	3325	6804	231	3280	3334	6845	0	32	9	41
Chattisgarh	135191	4163	34911	16604	55678	4163	34911	16600	55674	0	0	-4	-4
Delhi	1483	6.76	49.84	119.98	176.58	6.76	49.48	119.96	176.2	0	-0.4	0	0
Goa	3702	543	578	1091	2212	543	585	1091	2219	0	7	0	7
Gujarat	196022	376	5249	8995	14620	376	5231	9012	14619	0	-18	17	-1
Haryana	44212	27	463	1104	1594	27	457	1124	1608	0	-6	20	14
Himachal Pradesh	55673	3224	6383	5061	14668	3224	6381	5074	14679	0	-2	13	11
Jammu & Kashmir	222236	4140	8760	9637	22537	4140	8760	9639	22539	0	0	2	2
Jharkhand	79714	2590	9899	10405	22894	2590	9917	10470	22977	0	18	65	83
Karnataka	191791	1777	20181	14232	36190	1777	20179	14238	36194	0	-2	6	4
Kerala	38863	1443	9410	6471	17324	1442	9394	6464	17300	-1	-16	-7	-24
Madhya Pradesh	308245	6647	35007	36046	77700	6640	34986	36074	77700	-7	-21	28	0
Maharashtra	307713	8739	20834	21077	50650	8736	20815	21095	50646	-3	-19	18	-4
Manipur	22327	701	5474	11105	17280	730	6151	10209	17090	29	677	-896	-190
Meghalaya	22429	410	9501	7410	17321	433	9775	7067	17275	23	274	-343	-46
Mizoram	21081	134	6149	12900	19183	134	6086	12897	19117	0	-63	-3	-66
Nagaland	16579	1274	4897	7293	13464	1293	4931	7094	13318	19	34	-199	-146
Orissa	155707	7073	21394	20388	48855	7060	21366	20477	48903	-13	-28	89	48
Punjab	50362	0	733	931	1664	0	736	1028	1764	0	3	97	100
Rajasthan	342239	72	4450	11514	16036	72	4448	11567	16087	0	-2	53	51
Sikkim	7096	500	2161	698	3359	500	2161	698	3359	0	0	0	0
Tamil Nadu	130058	2926	10343	10282	23551	2948	10321	10356	23625	22	-22	74	74
Tripura	10486	109	4702	3174	7985	109	4686	3182	7977	0	-16	8	-8
Uttar Pradesh	240928	1626	4563	8152	12341	1626	4559	8153	14338	0	-4	1	-3
Uttarakhand	53483	4762	14165	5568	24495	4762	14167	5567	24496	0	2	-1	1
West Bengal	88752	2987	4644	5363	12994	2984	4686	5365	12995	-3	2	2	1
A & N Islands	8249	3762	2405	495	6662	3761	2416	547	6724	-1	11	52	62
Chandigarh	114	1	10	6	17	1.35	9.55	5.88	16.78	0.35	-0.4	-0.1	-0.22
Dadra and Nagar Haveli	491	0	114	97	211	0	114	97	211	0	0	0	0
Daman and DIU	112	0	0.62	5.03	5.65	0	0.62	5.53	6.15	0	0	0.5	0.5
Lakshwadeep	32	0	16.71	9.77	26.48	0	17.18	9.88	27.06	0	0.47	0.11	0.58
Puducherry	480	0	34.1	15.87	49.77	0	35.37	14.69	50.06	0	1.27	-1.2	0.09
India	3287263	83428	320238	288728	692394	83471	320736	287820	692027	43	498	-908	-367

Source: India State of Forest Report 2011

3.5.2 A significant decrease in the forest cover is reported from Andhra Pradesh, Arunachal Pradesh, Assam, Chhatisgarh, Nagaland and Tripura whereas the states of Jharkhand, Manipur, Meghalaya, Mizoram and Orissa have shown a significant increase in forest cover.

The table 3.5.2 exhibits the Changes in forest cover of the north-eastern region

Table 3.5.2: Changes in forest cover of the north-eastern region

Sl. No.	States/Uts	Forest Cover Assessment		Change in Forest Cover over assessment years						
		2011	2007	1995	1997-99	2001	2003	2005	2007	2011
1	2	3	4	5	6	7	8	9	10	11
1	Arunachal Pradesh	67410	67353	- 19	245	913	-2068	-220	-119	-74
2	Assam	27673	27692	- 237	- 136	1602	2445	23	-66	-19
3	Manipur	17090	17280	- 140	- 34	505	-630	-307	328	-190
4	Meghalaya	17275	17321	- 57	- 24	902	390	280	116	-46
5	Mizoram	19117	19240	199	- 437	-1941	2186	17	640	-66
6	Nagaland	13318	13464	- 70	- 57	-184	35	-350	-201	-146
7	Sikkim	3359								0
8	Tripura	7977	8073	8	199	3124	-746	50	-100	-8
Total		173219	170423	- 316	- 244	4921	1612	-507	598	-549

Source :India State of Forest Report, 2011

Note: Column 6 to 10 indicates change in the forest cover with respect to previous assesment year (eg. Year X1 - X2 means Area in Year X2 - Area in Year X1)

3.5.3 It is very important to examine the details of changes in forest cover of the north eastern region of forest cover to total forest cover of the Country. The share of north-eastern region is only 7.98% of the geographical area of the country, but, it accounts for nearly one-fourth of its forest cover. The region has been identified as one of the 18 biodiversity hot-spots of the world.

Table 3.5.3: State/UT wise tree cover estimates

Sl. No.	State/UT	Geographic Area (Km ²)	Tree Cover	
			Area (Km ²)	% of Geog. Area
1	2	3	5	6
1	Andhra Pradesh	275069	7152	2.60
2	Arunachal Pradesh	83743	549	0.66
3	Assam	78438	1564	1.99
4	Bihar	94163	2369	2.52
5	Chhattisgarh	135191	3866	2.86
6	Delhi	1483	120	8.09
7	Goa	3702	286	7.73
8	Gujarat	196022	7837	4.00
9	Haryana	44212	1395	3.16
10	Himachal Pradesh	55673	623	1.12
11	Jammu & Kashmir	222236	6550	2.95
12	Jharkhand	79714	2914	3.66
13	Karnataka	191791	5733	2.99
14	Kerala	38863	2755	7.09
15	Madhya Pradesh	308245	7090	2.30
16	Maharashtra	307713	9079	2.95
17	Manipur	22327	193	0.86
18	Meghalaya	22429	578	2.58
19	Mizoram	21081	190	0.90
20	Nagaland	16579	322	1.94
21	Odisha	155707	4301	2.76
22	Punjab	50362	1699	3.37
23	Rajasthan	342239	8272	2.42
24	Sikkim	7096	25	0.35
25	Tamil Nadu	130058	4718	3.63
26	Tripura	10486	184	1.75
27	Uttar Pradesh	240928	7382	3.06
28	Uttarakhand	53483	642	1.20
29	West Bengal	88752	2335	2.63
30	A. & N. Islands	8249	39	0.47
31	Chandigarh	114	10	8.77
32	Dadra & Nagar Haveli	491	29	5.91
33	Daman & Diu	112	9	8.04
34	Lakshadweep	32	5	15.63
35	Puducherry	480	31	6.46
Total		3287263	90844	2.76

Source :India State of Forest Report, 2011

3.5.4 In India, only 2.76% of total geographical area is having tree cover. The table 3.5.3 elaborates the State/ UT wise details of tree cover.

Table 3.5.4 : Physiographic zone wise tree cover estimate

Sl. No.	Physiographic Zone	Geographic Area (Sq Km)	2009		2011	
			Tree Cover		Tree Cover	
			Area (Sq Km)	% of Geog. Area	Area (Sq Km)	% of Geog. Area
1	2	3	4	5	6	7
1	Western Himalayas	329255	8091	2.46	7859	2.39
2	Eastern Himalayas	74618	324	0.43	356	0.48
3	North East	133990	2243	1.67	2275	1.70
4	Northern Plains	295780	9473	3.20	9366	3.17
5	Eastern Plains	223339	5444	2.44	5168	2.31
6	Western Plains	319098	7497	2.35	7038	2.21
7	Central Highlands	373675	9150	2.45	9886	2.65
8	North Deccan	355988	7559	2.12	7007	1.97
9	East Deccan	336289	11157	3.32	10718	3.19
10	South Deccan	292416	8002	2.74	8012	2.74
11	Western Ghats	72381	3847	5.31	4083	5.64
12	Eastern Ghats	191698	4051	2.11	4420	2.31
13	West Coast	121242	9427	7.78	8863	7.31
14	East Coast	167494	6504	3.88	5791	3.46
Total		3287263	92769	2.82	90844	2.76

Source : India State of Forest Report-2011



3.5.5 The Country has been stratified into 14 physiographic zones. Among them, the zones with highest tree cover to its total geographic area are West Coast (7.31%) followed by Western Ghats (5.64%). The zone wise details are shown in the table 3.5.4.

The table 3.5.5 presents the details of growing stock according to physiographic zones.

Table 3.5.5: Physiographic zone wise growing stock

Sl. No.	Physiographic Zone	Area of Phy.Zone (Km ²)	Recorded Forest Area (Km ²)	Growing Stock (volume in million Cum)		
				In Forest	In Tree Outside Forest*	Total
1	2	3	4	5	6	7
1	W. Himalayas	329255	91073	1021.94	191.23	1213.03
2	E. Himalayas	74618	47965	473.2	67.11	542.55
3	North East Ranges	133990	79431	341.14	93.67	443.99
4	Northern Plains	295780	13992	142.6	101.96	246.87
5	Eastern Plains	223339	31709	240.53	102.36	337.96
6	Western Plains	319098	13694	7.93	66.10	82.29
7	Central Highlands	373675	80788	109.37	108.52	220.23
8	North Deccan	355988	87260	281.07	83.00	364.54
9	East Deccan	336289	128757	622.18	191.49	820.92
10	South Deccan	292416	49451	224.42	127.59	358.70
11	Western Ghats	72381	32399	461.78	117.47	580.46
12	Eastern Ghats	191698	74418	360.65	67.73	435.91
13	West Coast	121242	20736	106.21	141.98	254.08
14	East Coast	167494	17839	105.63	88.21	196.69
Total		3287263	769512	4498.65	1548.42	6098.22

Source :India State of Forest Report, 2009

3.5.6 The Forest Produce also has some role in the degradation of forests. Forest produce is defined under section 2(4) of the Indian Forest Act, 1927. Its legal definition includes timber, charcoal, wood-oil, resin, natural varnish, bark, lac, myrobalans, mahua flowers (whether found inside or brought from a forest or not), trees and leaves, flowers and fruit, plants (including grass, creepers, reeds and moss), wild animals, skins, tusks, horns, bones, cocoons, silk, honey, wax, other parts or produce of animals, and also includes peat, surface soil, rocks and minerals etc. when found inside or brought from a forest, among other things. Forest produce can be divided into several categories. From the point of view of usage, forest produce can be categorized into three types: Timber, Non Timber and Minor Minerals.

The tables 3.5.6 to 3.5.8 at presents the details of State wise Production of forest produce.

Table 3.5.6: State-wise production of forest produce (2004-05)

Sl. No.	State/ Union Territory	Round Wood		Wood Fuel	Saw logs & Veneer logs		Pulp wood		Other Industrial roundwood (poles & Posts)		Sawn wood		Chips & particles	Wood residues	Wood charcoal	
		C	NC	(cum)	C	NC	C	NC	C	NC	C	NC	MT	MT	MT	MT
		(cum)	(cum)		(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	(cum)				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	A & N Islands															
2	Andhra Pradesh	2308.00	0.00	0.00	0.00	0.00	0.00	432331.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3	Arunachal Pradesh	19967.46	0.00	13320.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	191.55	
4	Assam	0.00	6419.00	365.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
5	Bihar															
6	Chandigarh															
7	Chhattisgarh	0.00	0.00	97500MT	0.00	161000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
9	Daman & Diu															
10	Delhi															
11	Goa	0.00	17352.72	29132.44	0.00	0.00	0.00	0.00	0.00	2727.00	0.00	0.00	0.00	0.00	345384 kgs	
12	Gujarat	0.00	18293.85	146553.34(mt)	NA	0.00	NA	NA	NA	18013.16	0	957.16 cm	NA	NA	NA	
13	Haryana															
14	Himachal Pradesh	8731.24	103.43	36874.67	13533.85	4482.59	3888.50	728.00	2324.00	0.00	74972.16	2.00	0.00	0.00	10591.60	
15	Jammu & Kashmir	35600.00	0.00	24337.00	0.00	0.00	0.00	0.00	0.00	0.00	60650.00	0.00	0.00	0.00	0.00	
16	Jharkhand															
17	Karnataka															
18	Kerala															
19	Lakshadweep															
20	Madhya Pradesh	0.00	265000.00	271000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
21	Maharashtra	0.00	46000.00	130000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
22	Manipur															
23	Meghalaya															
24	Mizoram	200.00	0.00	236.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	140.03	0.00	236.32	
25	Nagaland	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
26	Odisha	0.00	10709.00	4798 MT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
27	Punducherry															
28	Punjab	-	91308.00	-	-	-	-	-	-	-	-	-	-	-	-	
29	Rajasthan	27715.26	0.00	36752.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
30	Sikkim															
31	Tamil Nadu															
32	Tripura	0.00	759.49	3717.92	0.00	0.00	0.00	0.00	0.00	1693.80	0.00	0.00	0.00	0.00	0.00	
33	Uttar Pradesh	-	133827.00	16269.00	-	-	-	-	-	-	-	-	-	-	-	
34	Uttarakhand	62336.00	120311.00	54371.00	-	-	-	53085.00	=	=	21265.35	39.81	-	-	366.63	
35	West Bengal	85993.00		167321.00	-	-	156771.00	-	-	-	-	-	-	-	-	
Total		220575.50	703664.48	770011.74	13533.85	4482.59	160659.50	53813.00	2324.00	22433.96	156887.51	41.81	140.03	0.00	11194.55	

Source: Indian Council of Forestry Research and Education, Dehradun

C- Coniferous NC-coniferous

* 1 bag=10 to 15 kg.

Table 3.5.7 : State-wise production of forest produce (2005-06)

Sl. No.	State/ Union Territory	Round Wood		Wood Fuel	Saw logs & Veneer logs		Pulp wood		Other Industrial		Sawn wood		Chips &	Wood	Wood
		C	NC		C	NC	C	NC	C	NC	C	NC			
		(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	MT	MT	MT	MT
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	A & N Islands														
2	Andhra Pradesh	23028.00	0.00	0.00	0.00	0.00	43323.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Arunachal Pradesh	40656.43	0.00	12878.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Assam	0.00	12064.00	510.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5	Bihar														
6	Chandigarh														
7	Chhattisgarh	0.00	0.00	70000MT	0.00	123000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Daman & Diu														
10	Delhi														
11	Goa														
12	Gujarat	NA	16661.52	62636.24MT	NA	NA	NA	NA	NA	10160.83	NA	630.97cum	NA	NA	NA
13	Haryana														
14	Himachal Pradesh	8089.46	66.00	22291.00	13423.06	3705.07	6430.50	0.00	2065.00	0.00	69259.49	0.00	0.00	0.00	7924.93
15	Jammu & Kashmir	51250.00	0.00	22924.00	0.00	0.00	0.00	0.00	0.00	0.00	35150.00	0.00	0.00	0.00	0.00
16	Jharkhand														
17	Karnataka														
18	Kerala														
19	Lakshadweep														
20	Madhya Pradesh	0.00	268000.00	296000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	Maharashtra	56049.00	74332.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	Manipur														
23	Meghalaya														
24	Mizoram	250.00	0.00	1203.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	170.02	0.00	26.37
25	Nagaland	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
26	Odisha	0.00	15827.00	13216MT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	Puducherry														
28	Punjab	-	134553.00	-	-	-	-	-	-	-	-	-	-	-	-
29	Rajasthan	27125.47	0.00	38435.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	Sikkim														
31	Tamil Nadu														
32	Tripura	0.00	351.02	6462.36	0.00	0.00	0.00	0.00	0.00	2472.01	0.00	0.00	0.00	0.00	0.00
33	Uttar Pradesh	-	159837.00	10148.00	-	-	-	-	-	-	-	-	-	-	-
34	Uttarakhand	77775.00	168265.00	63898.00	-	-	-	85279.00	=	=	34262.42	75.52	-	-	353.30
35	West Bengal														
Total		284223.36	849956.54	474750.31	13423.06	126705.07	49753.81	85279.00	2065.00	12632.84	138671.91	75.52	170.02	0.00	8304.60

Source: Indian Council of Forestry Research and Education, Dehradun

C- Coniferous NC-coniferous

* 1 bag=10 to 15 kg.

Table 3.5.8: State-wise production of forest produce --concl.d.

Sl. No.	State/Union Territory	Gums (Metric Tonne)				Resins (MetricTonne)			
		2002-03	2003-04	2004-05	2005-06	2002-03	2003-04	2004-05	2005-06
1	2	3	4	5	6	7	8	9	10
1	A & N Islands	NA	NA			NA	NA		
2	Andhra Pradesh	996.10	762.90	9546.00	6953.69	0.00	0.00	0.00	0.00
3	Arunachal Pradesh	0.00	0.00	0.00	0.00	8846.00	0.00	4040.00	141530.00
4	Assam	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Bihar								
6	Chandigarh	-	-			-	-		
7	Chhattisgarh			128.31	67.68			0.00	0.00
8	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Daman & Diu								
10	Delhi								
11	Goa	0.00	0.00	0.00		0.00	0.00	0.00	
12	Gujarat	67.94	65.1	66.54	78.63	0.00	0.00	-	-
13	Haryana	-	-	-	-	-	-	-	-
14	Himachal Pradesh	7322.4	7257.4	NA	NA	8494.40	84227.00	8797.00	8508.00
15	Jammu & Kashmir	0.00	0.00	0.00	0.00	10783.00	10284.00	3941.00	6748.00
16	Jharkhand	0.00	0.00			0.00	0.00		
17	Karnataka	1.90	1.70			0.00	0.00		
18	Kerala								
19	Lakshadweep								
20	Madhya Pradesh			Quintals 422.0	Quintals 333.9			0.00	0.00
21	Maharashtra	975.00	941.00	Quintals 6954	Quintals 11004	0.00	0.00	0.00	0.00
22	Manipur								
23	Meghalaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	Mizoram	0.00	0.00	-	-	0.00	0.00	-	-
25	Nagaland			0.00	0.00			0.00	0.00
26	Odisha	0.07	6.10	0.00	0.00	0.00	0.00	0.00	0.00
27	Puducherry								
28	Punjab	0.00	0.00			0.00	0.00		
29	Rajasthan	0.00	0.00	NA	NA	0.00	0.00	NA	NA
30	Sikkim	0.00	0.00			0.00	0.00		
31	Tamil Nadu								
32	Tripura	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Uttar Pradesh	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
34	Uttarakhand	0.00	0.00	-	-	15873.00	17146.00	17983.00	18349.00
35	West Bengal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Indian Council of Forestry Research and Education, Dehradun

Note: Blank cell indicates information is not available

C : Coniferous

NC : Non- conserous

1 Std.bag= 0.5 Quintals (Approximately)

3.5.7 Mangrove cover assessment: Mangroves are various kinds of trees up to medium height and shrubs that grow in saline coastal sediment habitats. At the intersection of land and sea, mangrove forests support a wealth of life, from fish to people, and may be more important to the health of the planet than we ever realized.

3.5.8 In India, the major mangrove areas are mainly in 10 State/ UTs of India and their details are given at table 3.5.9.

Table 3.5.9: State-wise list of mangrove areas

SI No.	State/UT	Mangrove Areas
1	2	3
1	West Bengal	Sunderbans.
2	Odisha	Bhaitarkanika, Mahandi, Subernarekha, Devi, Dharma, Mangrove Genetic Resource Centre, Chilka
3	Andhra Pradesh	Coringa, East Godavari, Krishna
4	Tamil Nadu	Pichavaram, Muthupet, Ramnad, Pulicat, Kazhuveli
5	Andman & Nicobar	North Andamans, Nicobar
6	Kerala	Vembanad, Kannur
7	Karnataka	Coondapur, Dakshin Kannada/Honnavar, Mangalore Forest Division, Karwar
8	Goa	Goa
9	Maharashtra	Achra-Ratnagiri, Devgarh-Vijay Durg, Veldur, Kundalika-Revdanda, Mumbra-Diva, Vikroli, Shreevardhan, Vaitarna, Vasasi-Manori, Malvan
10	Gujarat	Gulf of Kutch, Gulf of Khambat, Dumas-Ubhrat

Source : Annual Report 2012-13, Ministry of Environment & Forests

Table 3.5.10: State/UT wise mangrove cover assessment- Time Series

(Sq. km)

SI No.	State/UT	Year											
		1987	1989	1991	1993	1995	1997	1999	2001	2003	2005	2009	2011
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Andhra Pradesh	495	405	399	378	383	383	397	333	329	354	353	352
2	Goa	0	3	3	3	3	5	5	5	16	16	17	22
3	Gujarat	427	412	397	419	689	901	1031	911	916	991	1046	1058
4	Karnataka	0	0	0	0	2	3	3	2	3	3	3	3
5	Maharashtra	140	114	113	155	155	124	108	118	158	186	186	186
6	Odisha	199	192	195	195	195	211	215	219	203	217	221	222
7	Tamil Nadu	23	47	47	21	21	21	21	23	35	36	39	39
8	West Bengal*	2076	2109	2119	2119	2119	2123	2125	2081	2120	2136	2152	2155
9	Andaman & Nicobar	686	973	971	966	966	966	966	789	658	635	615	617
10	Puducherry	0	0	0	0	0	0	0	1	1	1	1	1
11	Kerala	0	0	0	0	0	0	0	0	8	5	5	6
12	Daman & Diu	0	0	0	0	0	0	0	0	1	1	1	1.56
Total		4046	4255	4244	4256	4533	4737	4871	4482	4448	4581	4639	4663

Source: India State of Forest Report 2009 and 2011

*: As per the West bengal Forest Department, mangrove area in Sundarban is 4200 sq. km.

which is almost double of the area estimated by FSI.

3.5.9 There is an increase of 419 sq.km in mangrove cover assessment from 1991 to 2011 at all India level considering the States as shown in table 3.5.10 .

3.5.10 The details of mangrove cover (2011) is given in Table 3.5.11.

Table 3.5.11 : State/UT wise mangrove cover, 2011

(Sq. km)

SI No.	State/UT	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove	Total	Change w.r.t. 2009 assessment
1	2	3	4	5	6	7
1	Andhra Pradesh	0	126	226	352	-1
2	Goa	0	20	2	22	5
3	Gujarat	0	182	876	1058	12
4	Karnataka	0	3	0	3	0
5	Kerela	0	3	3	6	1
6	Maharashtra	0	69	117	186	0
7	Odisha	82	97	43	222	1
8	Tamil Nadu	0	16	23	39	0
9	West Bengal	1038	881	236	2155	3
10	Andaman & Nicobar	283	261	73	617	2
11	Daman & Diu	0	0.12	1.44	1.56	0.56
12	Pudicherry	0	0	1	1	0
Total		1403	1658.12	1601.44	4662.56	23.56

Source:India State of Forest Report 2011

In India, very dense mangrove consists approximately of 30%, moderately dense 36% and open mangrove 34% of the total mangroves cover

3.6 Diversion of forest land for non-forest use

Forest Conservation Act of India-1980 with amendments in 1988, is to provide for conservation of forests and matters connected with protection of trees from illegal felling and destruction. This act covers all aspects of forests including reserve forests, protected forests or any forest land irrespective of its ownership. Main features of this act are,

- No part of a reserved forest land can be used for non - forest purpose by the state government without prior approval from the central government.
- State Government can not lease forest land or its portions to any private person or to any authority, corporation, agency or organization which are not managed or controlled by government.
- A forest land can be cleared of trees (which have grown naturally) only when this land is to be used for reforestation.

However, ground scenario as depicted at table 3.6.1 shows the alarming degree of the forest area diverted since the implementation of Forest conservation act 1980.

Table 3.6.1 : Diversion of forest land for non forest use since the enforcement of forest conservation act,1980

(Area in hectares)

Sl. No.	Year	Forest Area Diverted	Cumulative Area Diverted
1	1981	1331.70	1331.70
2	1982	3674.32	5006.02
3	1983	5100.51	10106.53
4	1984	9348.90	19455.43
5	1985	7676.83	27132.26
6	1986	9310.45	36442.71
7	1987	25925.97	62368.68
8	1988	4868.71	67237.39
9	1989	66768.09	134005.48
10	1990	127361.79	261367.27
11	1991	5065.35	266432.62
12	1992	21756.77	288189.39
13	1993	16182.51	304371.90
14	1994	59962.02	364333.92
15	1995	51428.98	415762.90
16	1996	32862.55	448625.45
17	1997	24738.43	473363.88
18	1998	18425.21	491789.09
19	1999	45784.41	537573.50
20	2000	22386.43	559959.93
21	2001	267897.61	827857.54
22	2002	51172.31	879029.85
23	2003	42729.68	921759.53
24	2004	33079.50	954839.03

Source : Forests & Wildlife Statistics, India, 2004,MOEF

The trend in forest area converted in various years is depicted below at chart 3.6.1.



3.7 Conservation measures to increase forest cover

3.7.1 A two pronged strategy to increase forest cover essentially comprises

- * (i) Improving canopy cover in the forest land; and
- * (ii) Undertaking afforestation in non-forest and degraded lands, preferably contiguous to forest blocks.

3.7.2 Realising the role of forests in controlling soil erosion, moderation of floods, recharging of ground aquifers, as habitat for wildlife, conservation of bio-diversity and gene pool, etc., programmes were launched as early as the Second Five Year Plan for extensive Watershed Management followed later by establishment of a Protected Areas Network, under the Wildlife (Protection) Act, 1972.

3.7.3 People's participation in the protection of forests: Participation of people in the protection and management of forests has been emphasised in the National Forest Policy, 1988. Pursuant to this policy, Government of India through its resolution dated 1st June '90 formalised the Joint Forest Management (JFM) Programme. The JFM is being practiced through constitution of forest protection committees.



Table: 3.7.1 : Status of Joint Forest Management in India

Sl. No.	State	No. of JFM Committees	Approximate No. of JFMC members (in lakhs)	Area under JFM (in ha.)
1	2	3	4	5
1	Andhra Pradesh	7718	1421000	1519000
2	Bihar	675	14175	691578
3	Chhattisgarh	7887	2763100	3319000
4	Goa	21	315	92300
5	Gujarat	3044	1290864	397203
6	Haryana*	1075	167300	60000
7	Himachal Pradesh	1109	55000	424649
8	Jammu & Kashmir*	4861	268360	40000
9	Jharkhand	10903	218000	2186000
10	Karnataka	4850	421871	603507
11	Kerala	605	66022	173235
12	Madhya Pradesh	15228	10300000	6687300
13	Maharashtra	12653	2573000	2673568
14	Odisha	11521	1580709	1065772
15	Punjab*	1378	183145	198466
16	Rajasthan	5282	573000	780000
17	Tamil Nadu	3337	1057901	721294
18	Uttar Pradesh*	2096	155692	93857
19	Uttarakhand	1824	72421	100576
20	West Bengal	4368	505149	646084
NE & Sikkim		100435	23687024	22473389
1	Assam	1558	9348	53216
2	Arunachal Pradesh	447	30295	24116
3	Manipur	577	46713	78528
4	Meghalaya	359	28189	28972
5	Mizoram	529	151423	45870
6	Nagaland	771	552983	40929
7	Sikkim	155	52727	88518
8	Tripura	472	44882	128200
		4868	916560	488348
Union Territories				
1	A & N Islands	4	360	262
2	Chandigarh	Nil	Nil	Nil
3	D & N Haveli	16	1631	No forest area has been transferred for management purpose
4	Daman & Diu	Nil	Nil	Nil
5	Lakshadweep			
6	New Delhi	Nil	Nil	Nil
7	Puducherry			
Total		20	1991	262
	Grand Total	105323	24605575	22961999

Source : Ministry of Environment & Forests, Forest Protection Division

* Figures based on the year 2006

3.8 Waste lands

3.8.1 In India, waste lands constitute approximately 14.75 % of the total geographic area covered. **Table 3.8.1 depicts the State wise distribution of waste lands.** The chart 3.8.1 shows the State /UT wise percentage of wasteland to the total geographic area in India.

Table 3.8.1: State Category wise total area under wastelands (sq.km) during 2008-09 vis-a-vis 2005-06 and change in Wasteland during the period

State	No of Districts	Total Geographic Area (TGA)	Total Waste Land(WL)		Change	Total Reduction	Total Increase	% of WL to TGA		% Change over 2005-06
			2005-06	2008-09				2005-06	2008-09	
Andhra Pradesh	23	275068	38788.22	37296.62	-1491.60	1682.10	190.46	14.10	13.56	-0.54
Arunachal Pradesh	16	83743	5743.83	14895.24	9151.41	108.48	9259.89	6.86	17.79	10.93
Assam	23	78438	8778.02	8453.86	-324.16	862.56	538.04	11.19	10.78	-0.41
Bihar	37	94171	6841.09	9601.01	2759.92	1895.09	4654.41	7.26	10.20	2.93
Chhattisgarh	16	135194	11817.82	11482.18	-335.64	379.06	43.15	8.74	8.49	-0.25
Delhi	1	1483	83.34	90.21	6.87	3.62	10.27	5.62	6.08	0.46
Goa	2	3702	496.27	489.08	-7.19	11.48	3.99	13.41	13.21	-0.19
Gujarat	25	196024	21350.38	20108.06	-1242.32	2858.99	1616.67	10.89	10.26	-0.63
Haryana	21	44212	2347.05	2145.98	-201.07	232.20	31.92	5.31	4.85	-0.45
Himachal Pradesh	12	55673	22470.05	22347.88	-122.17	197.25	75.57	40.36	40.14	-0.22
Jammu & Kashmir *	14	101387	73754.38	75435.77	1681.39	1191.48	2872.78	72.75	74.40	1.66
Jharkhand	24	79706	11670.14	11017.38	-652.76	1183.50	531.16	14.64	13.82	-0.82
Karnataka	27	191791	14438.12	13030.62	-1407.50	1477.98	70.82	7.53	6.79	-0.73
Kerala	14	38863	2458.69	2445.62	-13.07	247.55	234.44	6.33	6.29	-0.03
Madhya Pradesh	48	308252	40042.98	40113.27	70.29	258.95	329.25	12.99	13.01	0.02
Maharashtra	35	307690	38262.81	37830.82	-431.99	469.93	38.22	12.44	12.30	-0.14
Manipur	9	22327	7027.47	5648.53	-1378.94	2391.10	1012.14	31.48	25.30	-6.18
Meghalaya	7	22429	3865.76	4127.43	261.67	93.86	355.13	17.24	18.40	1.17
Mizoram	8	21081	6021.14	4958.64	-1062.50	2669.27	1606.71	28.56	23.52	-5.04
Nagaland	7	16579	4815.18	5266.72	451.54	721.75	1172.60	29.04	31.77	2.72
Odisha	30	155707	16648.27	16425.76	-222.51	271.75	48.69	10.69	10.55	-0.14
Punjab	20	50362	1019.50	936.83	-82.67	112.70	30.56	2.02	1.86	-0.16
Rajasthan	32	342239	93689.47	84929.10	-8760.37	10264.60	1503.37	27.38	24.82	-2.56
Sikkim	4	7096	3280.88	3273.15	-7.73	11.83	4.29	46.24	46.13	-0.11
Tamil Nadu	30	130058	9125.56	8721.79	-403.77	426.78	22.74	7.02	6.71	-0.31
Tripura	4	10486	1315.17	964.64	-350.53	486.15	135.07	12.54	9.20	-3.34
Uttarakhand	13	53483	12790.06	12859.53	69.47	440.35	509.86	23.91	24.04	0.13
Uttar Pradesh	70	240928	10988.59	9881.24	-1107.35	1269.71	163.08	4.56	4.10	-0.46
West Bengal	19	88752	1994.41	1929.20	-65.21	92.98	28.46	2.25	2.17	-0.07
Union Territory	8	9490	337.30	315.00	-22.30	27.33	4.68	3.55	3.32	-0.23
Total	599	3166414	472261.95	467021.16	-5240.79	32340.4	27098.4	14.91	14.75	-0.17

Source: Wastelands Atlas of India 2011, Ministry of Rural Development Department of Land resources

* Unmapped areas (J&K) 120849.00

3.9 Animal Species in India

India, a megadiverse country with only 2.4 percent of the land area, accounts for 7-8% of the recorded species of the world, including over 45,000 species of plants and 91,000 species of animals. It is situated at the tri-junction of the Afro-tropical, the Indo-Malayan and the Paleo-Arctic realms, which display significantly rich biodiversity. Being one of the 17 identified megadiverse countries, with 10 biogeographic regions, it is home to 8.58% of the mammalian, 13.66% of avian, 7.91% of reptilian, 4.66% of the amphibian, 11.72% of fish and 11.60% of plant species documented so far. India also harbours four of the 34 globally identified biodiversity hotspots viz. Himalaya, Indo-Burma, Western Ghats-Sri Lanka and Sundaland. A crucial characteristic of Indian agrobiodiversity is its species richness, with more than 300 wild ancestors and close relatives of cultivated plants. India is also recognised as one of the nine Vavilovian centres of origin and diversity of crop plants. The diverse physical features and climatic situations have formed ecological habitats like forests, grasslands, wetlands, coastal and marine ecosystems and desert ecosystems, which harbour and sustain immense biodiversity and contribute to human well-being.

Table 3.9.1: Estimated number/percentage of endemic species in India

Sl. No.	Taxon	Number of Species		Percentage
		Total	Endemic	
1	2	3	4	5
1	Protozoa			
I	Free living	1247	90	7.22
II	Parasitic	1330	550	41.35
2	Mesozoa	10	10	100.00
3	Porifera	500		
I	Freshwater	31	13	41.94
4	Cnidaria	842	10	1.19
5	Platyhelminthes	1650	1160	70.30
6	Rotifera	330	23	6.97
7	Gastrotica	100	64	64.00
8	Kinorhyncha	10	7	70.00
9	Nematoda	2902	400	13.78
10	Acanthocephala	229	203	88.65
11	Mollusca	5169		
I	Terrestrial	1487	498	33.49
II	Freshwater	183	77	42.08
12	Echiura	43	12	27.91
13	Annelida			
I	Oligochaeta	473	368	77.80
II	Hirudinea	59	25	42.37
14	Arthropoda			
I	Crustacea	2944	501	17.02
II	Insecta	61461	20765	33.79
III	Arachnida	5829	2623	45.00
15	Phoronida	11	1	9.09
16	Bryozoa	200	12	6.00
17	Entoprocta	10	1	10.00
18	Chaetognatha	30	3	10.00
19	Chordata			
I	Pisces	2662	341	12.81
II	Amphibia	314	233	74.20
III	Reptilia	464	197	42.46
IV	Aves	1300	81	6.23
V	Mammalia	397	45	11.34

Source :Zoological Survey of India-2013

Table 3.9.2 : Estimated number of described fauna from India

Taxonomic group	No. of species		% in India
	World	India	
PROTISTA (Protozoa)	31250	2577	8.24
ANIMALIA			
Mesozoa	71	10	14.08
Porifera	4562	500	10.96
Cnidaria	9924	1042	10.50
Ctenophora	100	12	12.00
Platyhelminthes	17500	1650	9.43
Nemertinea		-	
Rotifera	2500	330	13.20
Gastrotricha	3000	100	3.33
Kinorhyncha	100	10	10.00
Nematoda	30040	2902	9.66
Nematomorpha		-	
Acanthocephala	800	229	28.63
Sipuncula	145	35	24.14
Mollusca	66537	5169	7.77
Echiura	127	43	33.86
Annelida	12701	842	6.63
Onychophora	100	1	1.00
Arthropoda	999059	71480	7.15
Crustacea	35538	2944	8.28
Insecta	867582	61461	7.08
Arachnida	73451	5829	7.94
Pycnogonida	600	17	2.83
Chilopoda	3001	101	3.37
Diplopoda	7500	162	2.16
Symphyla	120	4	3.33
Merostomata	4	2	50.00
Phoronida	11	3	27.27
Bryozoa (Ectoprocta)	4000	200	5.00
Entoprocta	60	10	16.67
Brachiopoda	300	3	1.00
Chaetognatha	111	30	27.03
Tardigrada	514	30	5.84
Echinodermata	6225	779	12.51
Hemichordata	120	12	10.00
Chordata	46499	5163	11.10
Protochordata	2106	119	5.65
Pisces	21753	2662	12.24
Amphibia	5187	314	6.05
Reptilia	5821	464	7.97
Aves	9027	1233	13.66
Mammalia	4629	397	8.58
Total (Animalia)	1195887	89697	7.50
Grand (Protista+ Animalia)	1227137	92279	7.52

Source: Zoological Survey of India.

Animal Discovery 2012, Compiled by ZSI, June, 2013.

Table 3.9.3 : Recent addition in the list of threatened/ endangered species

As per the Gazette Notification in the Central Government (Ministry of Environment and Forests) has made following amendments in the Schedule of the Wild Life (Protection) Act, 1972 and included the following species in the Schedules of Threatened and endangered species (amended upto 2011).

<p>1 Schedule 1 PART I</p> <p>MAMMALS</p> <p>42*. Wroughton's free tailed bat (<i>Otomops wroughtoni</i>)</p>
<p>PART IIA</p> <p>**FISHES</p> <p>2. Shark and Ray</p> <p>(i) <i>Anoxypristis cuspidata</i> (ii) <i>Carcharhinus hemiodon</i> (iii) <i>Glyphius gangetics</i> (iv) <i>Glyphius glyphius</i> (v) <i>Himantura fluviatilis</i> (vi) <i>Pristis microdon</i> (vii) <i>Pristis zijsron</i> (viii) <i>Rhynchobatus djiddensis</i> (ix) <i>Urogymnus asperrimus</i></p>
<p>PART III</p> <p>BIRDS</p> <p>*19. Swiftlets (<i>Collocalia unicolor</i> and <i>Collocalia fusiphaga</i>)</p>
<p>Part IV B- **Mollusca</p> <p>1 <i>Cassis cornuta</i> 2 <i>Charonia tritonis</i> 3 <i>Conus milneedwardsi</i> 4 <i>Cypraeccsis rufa</i> 5 <i>Hippopus hippopus</i> 6 <i>Nautilus Pompilius</i> 7 <i>Tridacna maxima</i> 8 <i>Tridacna squamosa</i> 9 <i>Tudicla Spirillus</i></p>
<p>Schedule II</p> <p>PART II</p> <p>*16. Manqooses (All species of genus <i>Herpestes</i>)</p>
<p>2 Schedule IV</p> <p>* 6- A. Small Game - Omitted</p>
<p>19. **Mollusca</p> <p>i. <i>Cypraea lamanica</i> ii. <i>Cypraea mappa</i> iii. <i>Cypraea talpa</i> iv. <i>Fasciolaria trapezium</i> v. <i>Harpulina arausiaca</i> vi. <i>Lambis chiragra</i> vii. <i>Lambis chiragra arthitica</i> viii. <i>Lambis crocea</i> ix. <i>Lambis millepeda</i> x. <i>Lambis scorpius</i> xi. <i>Lambis truncata</i> xii. <i>Placenta placenta</i> xiii. <i>Strombus plicatus siboldii</i> xiv. <i>Turbomarmoratus</i> xv. <i>Turbo marmoratus Linnaeus</i></p>
<p>20 Horseshoe Crab (<i>Tachypleus gigas</i> and <i>Carcinoscorpius rotundicauda</i>) (Ins. By S.O. 2293 (E), dated 4th September,2009 (w.e.f. 9-9-2009) * (Vide Notification No. S.O. 1085 (E), dated 30th September 2002, published in the Gazetted of India, Extra., Pt. II, Sec. 3 (ii), dated 11th October, 2002) ** (Subs. By/Added by S.O. 1197 (E), dated 5th December, 2001 (w.e.f. 6-12-2001) and corrected by S.O. 233 (E), dated 19th February 2002).</p>

Source :Ministry of Environment & Forests, Government of India/ Zoological Survey of India 2011.

3.9.2 The details of endemic animal species in India is presented in table 3.9.1. The Indian Scenario vis –a –vis the global in respect of the species wise existence of animal kingdom is elaborated in table 3.9.2 . The share of various animal species in India is 7.52%.

3.9.3 As reports from the various corners of the globe indicate many animal species have already become extinct/ threatened. **The recent addition in the list of threatened / endangered species is shown in table 3.9.3 .**

The approximate number of rare and threatened vertebrates species in India is presented below.

Table 3.9.4: Rare and threatened species (vertebrates)

Sl. No.	Category	Approximate Number				
		Mammalian	Aves	Reptilia	Amphibia	Pisces
1	2	3	4	5	6	7
1	Extinct	1	0	0	0	0
2	Critically Endangered	10	13	5	13	5
3	Endangered	39	10	9	31	6
4	Vulnerable	47	54	11	21	29
5	Near Threatened	26	59	10	9	25
Total		123	136	35	74	65

Source : Zoological Survey of India-2013

The definitions and other details are in Table 3.9.5

3.10 Animal Species –Conservation measures

3.10.1 Areas rich in biodiversity and encompassing unique and representative ecosystems are identified and designated as Biosphere Reserves. The goal is to facilitate conservation of representative landscape and India's immense biological diversity as described above. Till date, 15 Biosphere Reserves have been set up. The last one was set up in 29.01.2008 at Kachchh covering parts of Kachchh, Rajkot, Surendranagar and Patan civil districts of Gujarat State. **The List of Biosphere reserves set up in India are shown in Table 3.10.1 .**

3.10.2 The wild life Act provided for setting up National parks and sanctuaries for wild life. The basic idea in trying to encourage wild life .is that human welfare is initially linked with it. The Government of India has pledged for all out efforts to conserve which not only seeks to protect and preserve what remains of wild fauna and flora but also seeks to augment this priceless national heritage.





Table 3.9.5 : Definitions -rare and threatened species

As per the Guidelines of the IUCN Red List Categories and Criteria (2010), species have been

Extinct (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycles and life form.

Extinct in the Wild (EW)

A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

Critically Endangered (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk or extinction in the wild.

Endangered (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

Vulnerable (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a very high risk of extinction in the wild.

Table 3.10.1 : Biosphere reserves setup in India

Sl. No.	Name of Biosphere Reserve	Area (in sq.km.)	Date of Notification	Location in the States/UT
1	2	3	4	5
1	Nilgiri	5520.00	01.08.1986	Part of Wynad, Nagarhole, Bandipur and Mudumalai, Nilambur, Silent Valley and Siruvani hills (Tamil Nadu, Kerala and Karnataka)-Western Ghats
2	Nanda Devi	5860.69	18.01.1988	Part of Chamoli, Pithoragarh & Almora Districts and valley of flowers (Uttarakhand)-West Himalayas
3	Nokrek	820.00	01.09.1988	Part of Garo Hills (Meghalaya)-East Himalayas
4	Manas	2837.00	14.03.1989	Part of Kokrajhar, Bongaigaon, Barpeta, Nalbari, Kamrup and Darang districts (Assam)-East Himalayas
5	Sunderbans	9630.00	29.03.1989	Part of Delta of Ganges & Barahmaputra river system (West Bengal)-Gigantic Delta
6	Gulf of Mannar	10500.00	18.02.1989	Indian part of Gulf of Mannar between India and Sri Lanka (Tamil Nadu)-Coasts
7	Great Nicobar	885.00	06.01.1989	Southern Most Islands of Andaman and Nicobar (A&N Islands)-Islands
8	Similipal	4374.00	21.06.1994	Part of Mayurbhanj district (Orissa)-Deccan Peninsula
9	Dibru-Saikhowa	765.00	28.07.1997	Part of Dibrugarh and Tinsukhia districts (Assam)-East Himalayas
10	Dehang Debang	5111.50	02.09.1998	Part of Siang and Debang Valley in Arunachal Pradesh-East Himalayas
11	Pachmarhi	4981.72	03.03.1999	Part of Betul, Hoshangabad and Chindwara Districts of Madhya Pradesh-Semi-Arid-Gujarat Rajputana
12	Kanchanjunga	2619.92	07.02.2000	Parts of North and West Sikkim
13	Agasthyamalai	3500.36	12.11.2001	Part of Thirunelveli and Kanya Kumari Districts in Tamil Nadu and Thiruvananthapuram, Kollam and Pathanamthita of Kerala (Tamil Nadu & Kerala)
14	Achankmar-Amarkantak	3835.31	30.3.2005	Part of Anuppur and Dindori Distt., of MP, part of Bilaspur distts., of Chhattisgarh State (Madhya Pradesh & Chattisgarh)
15	Kachchh	12454.00	29.01.2008	Parts of Kachchh, Rajkot, Surendranagar and Patan Civil Districts of Gujarat State
16	Cold Desert	7770.00	28.08.09	Pin Valley National Park and surroundings; Chandratat and Sarchu & Kibber Wildlife Sanctuary in Himachal Pradesh.
17	Seshachalam	4756.00	20.09.2010	Seshachalam hill range in Eastern Ghats encompassing part of Chittoor and Kadapa district in Andhra Pradesh
18	Panna	2998.98	25.08.2011	Part of Panna and Chhattarpur district in Madhya Pradesh

Source: Ministry of Environment and Forests, Annual Report-2012-13

Table 3.10.2 - Summary of Protected Area Statistics in India(as on 05/09/2011)

States/Uts	No. of NPS	Area Sq Km	No. of WLS	Area Sq Km	No. of PAs	Area Sq Km
Andhra Pradesh	6	1388.39	21	11618.12	27	13006.51
Arunchal Pradesh	2	2290.82	11	7487.75	13	9778.57
Assam	5	1977.79	18	1932.01	23	3909.80
Bihar	1	335.65	12	2851.67	13	3187.32
Chattisgarh	3	2899.08	11	3583.19	14	6482.27
Goa	1	107.00	6	647.91	7	754.91
Gujarat	4	479.67	23	16619.81	28	17326.48
Haryana	2	48.25	8	233.21	12	330.18
Himachal Pradesh	5	2271.38	32	7745.48	37	10016.86
Jammu and Kashmir	4	3925.00	15	10243.11	53	14997.86
Jharkhand	1	226.33	11	1955.82	12	2182.15
Karnataka	5	2472.18	22	4003.42	30	6482.52
Kerala	6	558.16	16	1822.86	23	2382.52
Madhya Pradesh	9	3656.36	25	7158.41	34	10814.77
Maharashtra	6	1273.60	35	14152.70	42	15429.79
Manipur	1	40.00	1	184.40	2	224.40
Meghalaya	2	267.48	3	34.20	5	301.68
Mizoram	2	150.00	8	1090.75	10	1240.75
Nagaland	1	202.00	3	20.34	4	222.36
Odisha	2	990.67	18	6969.15	20	7959.85
Punjab	0	0.00	12	323.70	15	344.72
Rajasthan	5	3947.07	25	5379.26	33	9548.60
Sikkim	1	1784.00	7	399.10	8	2183.10
Tamil Nadu	5	307.85	21	3521.95	27	3829.83
Tripura	2	36.71	4	566.93	6	603.64
Uttar Pradesh	1	490.00	23	5221.88	24	5711.88
Uttarakhand	6	4915.44	6	2418.61	14	7376.32
West Bengal	5	1693.25	15	1203.28	20	2896.53
Andaman & Nicobar	9	1153.94	96	389.39	105	1543.33
Chandigarh	0	0.00	2	26.01	2	26.01
Dadra and Nagar Haveli	0	0.00	1	92.16	1	92.16
Daman and Diu	0	0.00	1	2.19	1	2.19
Delhi	0	0.00	1	27.82	1	27.82
Lakshadweep	0	0.00	1	0.01	1	0.01
Puducherry	0	0.00	1	3.90	1	3.90
India	102	39888.07	515	119930.50	668	161221.59

NPs- National Parks : WLS- Wild Life Sanctuary: PAs- Protected Areas.

Source: India- State of the Forest Report , 2011.

Table 3.10.3 : All India tiger population in tiger reserves

Sl. No.	Name of Reserve	Years							
		1972	1979	1984	1989	1993	1995	1997	2001-02 *
1	2	3	4	5	6	7	8	9	10
1	Bandipur (Karnataka)	10	39	53	50	66	74	75	82
2	Corbett(Uttaranchal)	44	84	90	91	123	128	138	137
3	Kanha(Madhya Pradesh)	43	71	109	97	100	97	114	127
4	Manas(Assam)	31	69	123	92	81	94	125	65*
5	Melghat (Maharashtra)	27	63	80	77	72	71	73	73
6	Palamu (Jharkhand)	22	37	62	55	44	47	44	32
7	Ranthombore (Rajasthan)	14	25	38	44	36	38	32	35
8	Similipal(Orissa)	17	65	71	93	95	97	98	99
9	Sunderbans (West Bengal)	60	205	264	269	251	242	263	245
10	Periyar (Kerala)	-	34	44	45	30	39	40	36
11	Sariska (Rajasthan)	-	19	26	19	24	25	24	22
12	Buxa (West Bengal)	-	-	15	33	29	31	32	31
13	Indravati (Madhya Pradesh)	-	-	38	28	18	15	15	29
14	Nagarkimasagar (Andhra Pradesh)	-	-	65	94	44	34	39	67
15	Namdhapa (Arunachal Pradesh)	-	-	43	47	47	52	57	61
16	Dudhwa (Uttar Pradesh)	-	-	-	90	94	98	104	76*
17	Kalalad (Tamil Nadu)	-	-	-	22	17	16	28	27
18	Valmiki (Bihar)	-	-	-	81	49	N.R	53	53
19	Pench (Madhya Pradesh)	-	-	-	-	39	27	29	40
20	Tadoba (Maharashtra)	-	-	-	-	34	36	42	38
21	Bandhavgarh (Madhya Pradesh)	-	-	-	-	41	46	46	56
22	Panna (Madhya Pradesh)	-	-	-	-	25	22	22	31
23	Dampha(Mizoram)	-	-	-	-	7	4	5	4
24	Pench (Maharashtra)	-	-	-	-	-	(1994)	-	14
25	Bhadra (Karnataka)	-	-	-	-	-	-	-	35
26	Pakhui- Nameri (Arunachal Pradesh)	-	-	-	-	-	-	-	26 Nameri
27	Bori-Satpura (Madhya Pradesh)	-	-	-	-	30	-	-	35
Total		268	711	1121	1327	1366	1333	1498	1576

Source: Project Tiger, Ministry of Environment & Forests

* : under compilation/vetting

The area of tiger reserves in Tiger range States are depicted in table 3.10.4 .

Table 3.10.4 : Area of tiger reserves in tiger range states

(As on 26th September,2011)

Sl. No.	Year of Creation	Name of Tiger Reserve	State	Area of core/critical tiger habitat (In sq. Kms.)	Area of the buffer/peripheral (In Sq.Kms)	Total area
1	2	3	4	5		
1	1973-74	Bandipur	Karnataka	872.24	584.06	1456.3
2	1973-74	Corbett	Uttarakhand	821.99	466.32	1288.31
3	1973-74	Kanha	Madhya pradesh	917.43	1134.36	2051.79
4	1973-74	Manas	Assam	840.04	2310.88	3150.92
5	1973-74	Melghat	Maharashtra	1500.49	1268.03	2768.52
6	1973-74	Palamau	Jharkhand	414.08	Notification awaited	414.08
7	1973-74	Ranthambore	Rajasthan	1113.36	Notification awaited	1113.36
8	1973-74	Similipal	Odisha	1194.75	1555.25	2750
9	1973-74	Sunderbans	West Bengal	1699.62	885.27	2584.89
10	1978-79	Periyar	Kerala	881	44	925
11	1978-79	Sariska	Rajasthan	881.11	Notification awaited	881.11
12	1982-83	Buxa	West Bengal	390.58	367.32	757.9
13	1982-83	Indravati	Chhattisgarh	1258.37	1540.7	2799.07
14	1982-83	Nagarjunsagar	Andhra Pradesh	2527	Notification awaited	2527
15	1982-83	Namdapha	Arunachal Pradesh	1807.82	do	1807.82
16	1987-88	Dudhwa	Uttar Pradesh	693.7	do	693.7
	1999-2000	Katerniaghat (extension)		400.09	do	400.09
17	1988-89	Kalakad- Mundanthurai	Tamil Nadu	895	do	895
18	1989-90	Valmiki (not received)	Bihar	840*	do	840*
19	1992-93	Pench	Madhya Pradesh	411.33	768.3	1179.63
20	1993-94	Tadoba-Andheri	Maharashtra	625.82	1101.77	1727.59
21	1993-94	Bandhavgarh	Madhya Pradesh	716.9	820.03	1536.94
22	1994-95	Panna	Madhya Pradesh	576.13	Notification awaited	576.13
23	1994-95	Dampa	Mizoram	500	488	988
24	1998-99	Bhadra	Karnataka	492.46	571.83	1064.29
25	1998-99	Pench	Maharashtra	257.26	483.96	741.22
26	1999-2000	Pakke	Arunachal Pradesh	683.45	Notification awaited	683.45
27	1999-2000	Nameri	Assam	200	144	344
28	1999-2000	Satpura0	Madhya pradesh	1339.26	794.04	2133.31
Total						

continued..

Source : National Tiger Conservation Authority, Ministry of Environment and Forests

* Not yet notified

Table 3.10.4 : Area of tiger reserves in tiger range states

29	2008-09	Annamalai	Tamil Nadu	958	Notification awaited	958
30	2008-09	Udanti-Sita Nadi	Chattisgarh	851.09	991.45	1842.54
31	2008-09	Satkosia	Odisha	523.61	453.25*	976.86
32	2008-09	Kaziranga	Assam	625.58	548	1173.58
33	2008-09	Achanakmar	Chattisgarh	626.2	287.82	914.02
34	2008-09	Dandeli-Anshi	Karnataka	814.88	282.63	1097.51
35	2008-09	Sanjay-Dubri	Madhya Pradesh	812.57	861.93	1674.5
36	2008-09	Mudumalai	Tamil Nadu	321	Notification awaited	321
37	2008-09	Nagarahole	Karnataka	643.35	Notification awaited	643.35
38	2008-09	Parambikulam	Kerala	390.89	252.77	643.66
39	2008-09	Sahyadri(including Chandoli NP:317.67 and Koyna WLS:423.55)=741.22 Total Area	Maharashtra	741.22	Notification awaited	741.22
40	2011-2012	Biligiri Ranganatha Temple Tiger Reserve	Karnataka	359.1	215.72	574.82
41	2011-2012	Kawal**	Andhra Pradesh	-	-	-
Total				33418.78	19221.71	52640.5

Source : National Tiger Conservation Authority, Ministry of Environment and Forests

concluded

* Not yet notified

** Approval has been accorded by the NTCA for final notification, which has to be issued by the State Government.

Total core are notified 32578.78 sq.km

Total core are notified 18768.46 sq.km



Population of tigers –estimates by refined methodology is presented in the table 3.10.5. As per this data, the tiger population in India is approximately 1706 only.

Table 3.10.5 : Forest occupancy and population estimates of tiger

State	Tiger Population		Tiger Km ²	
	2006	2010	2006	2010
Shivalik-Gangetic Plain Landscape Complex				
Uttarakhand	178	227	1901	3476
Uttar Pradesh	109	118	2766	2511
Bihar	10	8	510	750
Shivalik Gangetic	297	353	5177	6712
Central Indian Landscape Complex and Eastern Ghats Landscape Complex				
Andhra Pradesh	95	72	14126	4495
Chhattisgarh	26	26	3609	3514
Madhya Pradesh	300	257	15614	13833
Maharashtra	103	168	4273	11960
Odisha	45	32	9144	3398
Rajasthan	32	36	356	637
Jharkhand	-	10	1488	1180
Central Indian	601	601	48610	39017
Western Ghats Landscape Complex				
Karnataka	290	300	18715	14414
Kerala	46	71	6168	6804
Tamil Nadu	76	163	9211	8389
Western Ghats	412	534	34094	29607
North East Hills and Brahmaputra Flood Plains				
Assam	70	143	1164	2381
Arunachal Pradesh	14	-	1685	1304
Mizoram	6	5	785	416
Northern West Bengal	10	-	596	799
North East Hills, and Brahmaputra	100	148	4230	4900
Sunderbans	-	70	1586	1645
Total Tiger Population	1411	1706	93697	81881

Source: National Tiger Conservation Authority, Project Tiger, 'Status of Tigers, Co- Predators, and Prey in India 2010', Ministry of Environment & Forests

India is famous for the majestic elephants of the Country. The protective measures adopted to save the elephant population of the country are very important. **The designated elephant reserves in India, the area, the number of elephants found are available in table 3.10.6**



Table 3.10.6 : Estimated population of wild elephants -2007-08

REGION	STATE	ELEPHANT POPULATION			
		1993	1997	2002	2007-08
North-East	Arunachal	2102	1800	1607	1690
	Assam	5524	5312	5246	5281
	Meghalaya	2872	1840	1868	1811
	Nagaland	178	158	145	152
	Mizoram	15	22	33	12
	Manipur	50	30	12	Nil
	Tripura	100	70	40	59
	West Bengal (North)	186	250	292	300-350
Total for North-East		11027	9482	9243	9305-9355
East	West Bengal (South)	14	26	36	25
	Jharkhand	550*	618*	772	624
	Odisha	1750	1800	1841	1862
	Chhattisgarh	-	-	-	122
Total for East		2314	2444	2649	2633
North	Uttarakhand	828*	1130*	1582	1346
	U.P.	47	70	85	380
Total for North		875	1200	1667	1726
South	Tamil Nadu	2307	2971	3052	3867
	Karnataka	5500	6088	5838	4035
	Kerala	3500	3600	3850	6068
	Andhra Pradesh	46	57	74	28
	Maharashtra	-	-	-	7
Total for South		11353	12716	12814	14005
Islands	Andaman & Nicobar	35	35	40	NA
Grand Total		25604	25877	26413	27669-27719 Mid value-

Source: Project Elephant Division, Ministry of Environment and Forest.

* As part of Bihar, Madhya Pradesh and Uttar Pradesh respectively

Table 3.10.7: State wise location of major zoos

Sl. No	State	Name of Zoo	Location
1	2	3	4
1	Andaman & Nicobar	Biological Park, Chidyatapu	Port Blair
2	Andhra Pradesh	Indira Gandhi Zoological Park	visakhapatnam
3	Andhra Pradesh	Nehru Zoological Park	Hyderabad
4	Andhra Pradesh	Sri Venkateswara Zoological Park	Tirupati
5	Arunachal Pradesh	Biological Park Itanagar	Itanagar
6	Assam	Assam State Zoo Cum Botanical Garden	Guwahati
7	Bihar	Sanjay Gandhi Biological Park	Patna
8	Chattisgarh	Kanan Pandari Zoo	Bilaspur
9	Chattisgarh	Maitri Baagh Zoo	Bhilai
10	Delhi	National Zoological Park	Delhi
11	Goa	Bondla Zoo	Usgao
12	Gujarat	Dr. Shyamaprasad Mukharjee Zoological Gard	Surat
13	Gujarat	Indoda Nature Park	Gandhi Nagar
14	Gujarat	Kamla Nehru Zoological Garden	Ahemdabad
15	Gujarat	Sakkarbaug Zoo	Junagarh
16	Gujarat	Sayaji Baug Zoo	Vadodara
17	Haryana	Rohtak Zoo	Rohtak
18	Himachal Pradesh	Himalayan Nature Park (Kufri)	Kufri
19	J&K	Jammu Zoo	Ram Nagar,(Jammu)
20	J & K	Kashmir Zoo	Srinagar
21	Jharkhand	Bhagwan Birsa Biological Park	Ranchi
22	Jharkhand	Jawaharlal Nehru Biological Park	Bokaro
23	Jharkhand	Tata Steel Zoological Park	Jamshedpur
24	Karnataka	Bellary Childrens Park-Cum-Zoo (Bellary Zoo)	Bellary
25	Karnataka	Children Park & Zoo (Gadag Zoo)	Gadag
26	Karnataka	Dr. K.Shivarma Karanth Pilikula Biological	Mangalore
27	Karnataka	National Park, Bannerghatta Zoological	Bangalore
28	Karnataka	Sri Chamarajendra Zoological Gardens	Mysore
29	Karnataka	Tiger & Lion Safari, Thyarekoppa	Shimoga
30	Kerala	State Museum & Zoo	Thrissur
31	Kerala	Thiruvananthapuram Zoo	Thiruvananthapuram
32	Madhya Pradesh	Gandhi Zoological Park	Gwalior
33	Madhya Pradesh	Kamla Nehru Prani Sanghralay Zoo	Indore
34	Madhya Pradesh	Van Vihar National Park	Bhopal
35	Maharashtra	Aurangabad Municipal Zoo	Aurangabad
36	Maharashtra	Mahatma Gandhi Rashtriya Udyan Zoo	Solapur
37	Maharashtra	Nisargakavi Bahlbnabai Choudhary Pranisansangahralay	Pune

Table 3.10.7: State wise location of major zoos Concl.d.

Sl. No	State	Name of Zoo	Location
1	2	3	4
38	Maharashtra	Rajiv Gandhi Zoological Park And Wildlife Research Centre	Pune
39	Maharashtra	Veer mata Jijabai Bhosale Udyan & Zoo	Mumbai
40	Manipur	Manipur Zoological Garden	Imphal
41	Meghalaya	Lady Hydari Park Animal	Shillong
42	Mizoram	Aizawl Zoo (Mizoram Zoo)	Aizawl
43	Orissa	Indira Gandhi Park Zoo & Deer Park	Rourkela
44	Orissa	Nandankanan Biological Park	Bhubaneswar
45	Orissa	Wild Animal Conservation Centre	Mothijharan Sambalpur
46	Punjab	Deer Park, Bir Moti Bagh (patiala Zoo)	Patiala
47	Punjab	Ludhiana Zoo	Ludhiana
48	Punjab	Mahendra Chaudhury Zoological Park	Chhatbir
49	Rajasthan	Bikaner Zoo	Bikaner
50	Rajasthan	Jaipur Zoo	Jaipur
51	Rajasthan	Jodhpur Zoo	Jodhpur
52	Rajasthan	Udaipur Zoo	Udaipur
53	Tamil Nadu	Amirdhi Zoo	Vellore
54	Tamil Nadu	Arignar Anna Zoological Park	Vandalur Chennai
55	Tamil Nadu	Chennai Snake Park Trust	Guindy
56	Tamil Nadu	Children's Corner	Guindy
57	Tamil Nadu	Madras Crocodile Bank Trust/Centre For	Mahabalipuram
58	Tamil Nadu	V.O.C. Park Mini Zoo	Coimbatore
59	Tripura	Sepahijala Zoological Park	Sepahijala
60	Uttar Pradesh	Kanpur Zoological Park	Kanpur
61	Uttar Pradesh	Lucknow Prani Udyan	Lucknow
62	Uttaranchal	Pt Govind Ballabh Pant High Altitude Zoo	Nainital
63	West Bengal	Alipore Zoological Garden	Kolkata
64	West Bengal	Calcutta Snake Park	Badu
65	West Bengal	Jhargram Zoo	Jhargram
66	West Bengal	Marble Palace Zoo	Kolkata
67	West Bengal	Padmaja Naidu Himalayan Zoological Park	Darjeeling

Source : Central Zoo Authority, Ministry of Environment & Forests

The following table gives the progress achieved in setting up National Parks and Wildlife Sancturries in India.



Table 3.10.8 : National parks and wildlife sanctuaries of India

Year	National Parks		Wildlife Sanctuaries		Total Area
	Number	Area	Number	Area	
1995	80	34684.53	441	114164.58	148849.11
1999	87	34021.15	485	113163.03	147184.18
2004	90	36881.53	502	120051.88	156933.41
2006	100	38024.11	514	117913.77	155980.15
2010	102	39888.00	515	119930	159818.00

Source: M/o Environment & Forests



3.11 Livestock Population

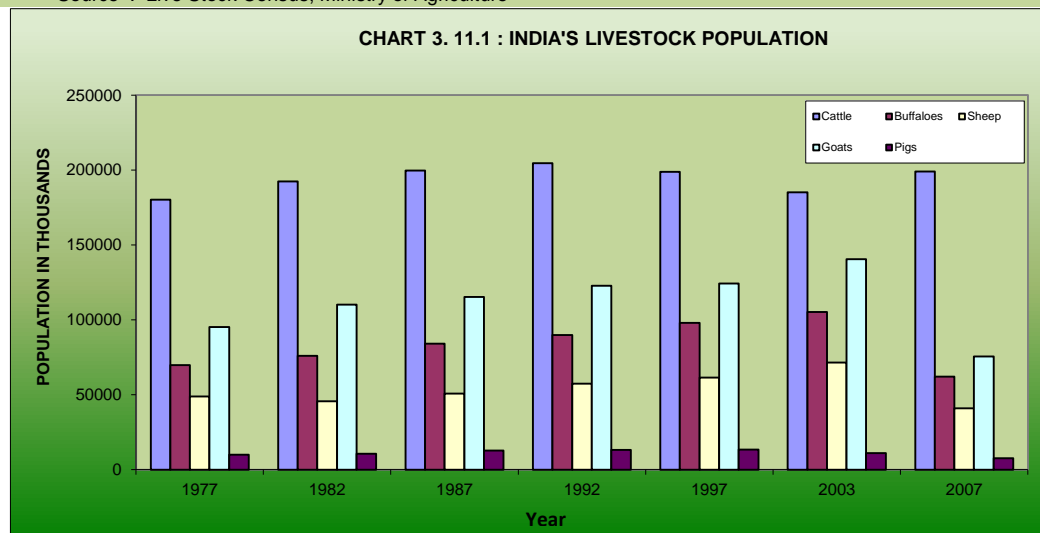
3.11.1 The livestock population in the country increased from 369 million in 1977 to the current estimate of 529 million (2007). Grazing by Livestock puts pressure on grasslands and forests. Because of excessive grazing, natural regeneration is either absent or inadequate in a significant portion of the forests in the country. (The next Livestock Census was conducted in 2012. The results are yet to be published.)

Table 3.11.1: India's livestock population

(Thousand)

Sl. No.	Livestock	Number of Animals						
		1977	1982	1987	1992	1997	2003	2007
1	2	3	4	5	6	7	7	8
1	Cattle	180.0	192.5	199.7	204.6	198.9	185.2	199.1
2	Buffaloes	62.0	69.8	76.0	84.2	89.9	97.9	105.3
3	Sheep	41	48.8	45.7	50.8	57.5	61.5	71.6
4	Goats	75.6	95.3	110.2	115.3	122.7	124.4	140.5
5	Horses & Ponnies	0.9	0.9	0.8	0.8	0.8	0.8	0.6
6	Pigs	7.6	10.1	10.6	12.8	13.3	13.5	11.1
7	Mules	0.1	0.1	0.2	0.2	0.2	0.2	0.1
8	Donkeys	1.1	1.0	1.0	1.0	0.9	0.7	0.4
9	Camels	1.068	1.1	1.0	1.0	0.9	0.6	0.5
II Other Livestock								
1	Yaks	0.1	0.1	0.0	0.1	0.1	0.1	0.1
2	Mithuns	0.1	0.2	0.1	0.2	0.2	0.3	-
Total		369.0	419.6	445.3	470.9	485.4	485.0	529.7

Source : Live Stock Census, Ministry of Agriculture



The trend and extent in growth of livestock population from 1977 to 2007 at all India level are evident from the above table.

3.11.2 An analysis of forests vis-a-vis livestock indicates continued free access to the forest area which has resulted in high rates of growth of livestock population causing land degradation and arresting the development of markets for forage crops. Overgrazing impedes regeneration, retards growth of vegetation, and leads to extinction of good palatable grasses which are replaced by less palatable and inferior grasses. Extensive areas have been invaded by bushes which are not browsed, excessive trampling makes the soil compact and impervious and prevents circulation of air, water, thus exposing the soil to erosion by wind and water.

The State / UT wise livestock population details as per 2007 census are in table 3.11.2

Table 3.11.2: Livestock population as per 2007 census														Provisional	
Sr. No.	States/UTs	Cattle			Buffalos	Sheep	Goats	Pigs	Horses and ponies	Mules	Donkeys	Camel	Yaks	Mithun	Total Live-stock
		Cross bred	Indigenous	Total											
1	Andhra Pradesh	1898	9325	11223	13272	25539	9626	439	26	0	50	0	0	0	60175
2	Arunachal Pradesh	29	474	503	3	20	292	356	6	0	0	0	14	219	1413
3	Assam	410	9631	10041	500	354	4320	2000	11	0	0	0	0	0	17227
4	Bihar	1976	10583	12559	6690	218	10167	632	51	0	24	0	0	0	30342
5	Chhatisgarh	186	9305	9491	1604	140	2768	413	1	0	0	0	0	0	14418
6	Goa	16	55	71	37	0	11	58	0	0	0	0	0	0	177
7	Gujarat	1142	6834	7976	8774	2002	4640	22	14	0	50	38	0	0	23515
8	Haryana	566	986	1552	5953	601	538	134	26	11	5	39	0	0	8859
9	Himachal Pradesh	793	1476	2269	762	901	1241	2	13	19	7	0	2	0	5217
10	Jammu & Kashmir	1677	1766	3443	1050	4127	2068	1	167	42	24	2	62	0	10987
11	Jharkhand	191	8590	8781	1506	483	6592	732	5	0	1	0	0	0	18100
12	Karnataka	2193	8309	10503	4327	9558	6153	281	11	0	26	0	0	0	30859
13	Kerala	1621	119	1740	58	1	1729	59	0	0	0	0	0	0	3587
14	Madhya Pradesh	475	21441	21915	9129	390	9014	193	27	3	20	4	0	0	40696
15	Maharashtra	3122	13061	16184	6073	2909	10391	327	38	0	32	0	0	0	35954
16	Manipur	66	276	342	62	9	51	314	1	0	0	0	0	10	789
17	Meghalaya	27	860	887	23	21	365	524	2	0	0	0	0	0	1823
18	Mizoram	11	24	35	6	1	16	267	1	0	0	0	0	2	328
19	Nagaland	254	216	470	35	4	178	698	1	0	0	0	0	33	1419
20	Odisha	1703	10607	12310	1190	1818	7127	612	0	0	0	0	0	0	23057
21	Punjab	1278	498	1777	5062	208	290	26	33	6	5	2	0	0	7408
22	Rajasthan	816	11304	12120	11092	11190	21503	209	25	1	102	422	0	0	56663
23	Sikkim	73	62	135	0	3	92	35	0	0	0	0	5	0	270
24	Tamilnadu	7383	3806	11189	2009	7991	9275	284	7	0	5	0	0	0	30759
25	Tripura	79	875	954	14	4	633	264	0	0	0	0	0	0	1869
26	Uttar Pradesh	1945	16938	18883	23812	1188	14793	1350	122	31	84	9	0	0	60272
27	Uttarakhand	339	1896	2235	1220	290	1335	20	15	24	1	0	0	0	5141
28	West Bengal	2642	16546	19188	764	1577	15069	815	6	0	0	0	0	0	37419
29	A & Nicobar	14	36	49	10	0	67	48	0	0	0	0	0	0	174
30	Chandigarh	5	1	7	20	0	1	0	0	0	0	0	0	0	28
31	D & Nagar Haveli	1	55	57	4	0	25	0	0	0	0	0	0	0	87
32	Daman & Diu	0	3	3	1	0	3	0	0	0	0	0	0	0	7
33	Delhi	44	47	92	278	6	21	20	1	0	0	0	0	0	418
34	Lakshadweep	4	3	7	0	0	76	0	0	0	0	0	0	0	82
35	Pondicherry	78	6	84	3	4	69	1	0	0	0	0	0	0	162
	All India	33060	166015	199075	105343	71558	140537	11134	611	137	438	517	83	264	529698

Source: Department of Animal Husbandry and Dairying & Fisheries, M/O Agriculture (18th Livestock Census)
Provisional results derived from village level total.

3.12 FISHERY

3.12.1 India with a large number of inland water resources and had a long sea cost line is a rich source of fishery. **Table 3.12.1 depicts the marine fishery resources in India.**

Table 3.12.1 : Marine fishery resources of India

Sl. No.	State/Union Territory	Approx length of coast line (Kms)	Continental Shelf ('000 Sq Kms.)	Number of Landing Centres	Number of Fishing Villages
1	Andhra Pradesh	974	33	353	555
2	Goa	104	10	33	39
3	Gujarat	1600	184	121	247
4	Karnataka	300	27	96	144
5	Kerala	590	40	187	222
6	Maharashtra	720	112	152	456
7	Odisha	480	26	73	813
8	Tamil Nadu	1076	41	407	573
9	West Bengal	158	17	59	188
10	Andaman & Nicobar Islands	1912	35	16	134
11	Daman & Diu	27	-	5	11
12	Lakshadweep	132	4	10	10
13	Puducherry	45	1	25	40
TOTAL		8118	530	1537	3432

Source: Annual report 2012-13, Department of Animal Husbandry and Dairying, Ministry of Agriculture (Marine Fisheries Census,2005)



3.12.2 The fish production (marine & inland) at all India level over the years, is presented at Table 3.12.2. It is pertinent to mention that, though the marine and inland fish production are showing an overall increasing trend, the marine fish production is lower than the inland production in recent years.

Table 3.12.2 : Fish production

(Lakh tonne)

Sl No.	Year	Marine	Inland	Total
1	2	3	4	5
1	1950-51	5.34	2.18	7.52
2	1960-61	8.80	2.80	11.60
3	1970-71	10.86	6.70	17.56
4	1980-81	15.55	8.87	24.42
5	1981-82	14.45	9.99	24.44
6	1982-83	14.27	9.40	23.67
7	1983-84	15.19	9.87	25.06
8	1984-85	16.98	11.03	28.01
9	1985-86	17.16	11.60	28.76
10	1986-87	17.13	12.29	29.42
11	1987-88	16.58	13.01	29.59
12	1988-89	18.17	13.35	31.52
13	1989-90	22.75	14.02	36.77
14	1990-91	23.00	15.36	38.36
15	1991-92	24.47	17.10	41.57
16	1992-93	25.76	17.89	43.65
17	1993-94	26.49	19.95	46.44
18	1994-95	26.92	20.97	47.89
19	1995-96	27.07	22.42	49.49
20	1996-97	29.67	23.81	53.48
21	1997-98	29.50	24.38	53.88
22	1998-99	26.96	26.02	52.98
23	1999-00	28.52	28.23	56.75
24	2000-01	28.11	28.45	56.56
25	2001-02	28.30	31.26	59.56
26	2002-03	29.90	32.10	62.00
27	2003-04	29.41	34.58	63.99
28	2004-05*	27.79	35.25	63.05
29	2005-06	28.16	37.56	65.72
30	2006-07	30.24	38.45	68.69
31	2007-08	29.20	42.07	71.27
32	2008-09	29.78	46.38	76.16
33	2009-10	31.03	48.10	79.13
34	2010-11(P)	32.20	50.70	82.90

Source : Annual Report-2012-13, Department of Animal Husbandry and Dairying, Ministry of Agriculture*: Revised (P) : Provisional

Table 3.12.3 : State-wise fish production

Sl. No.	States/UT's	1997-98			2001-2002		
		Marine	Inland	Total	Marine	Inland	Total
1	2	3	4	5	3	4	5
1	Andhra Pradesh	146545	226314	372859	204940	471165	676105
2	Arunachal Pradesh	0	2130	2130	0	2600	2600
3	Assam	0	155132	155132	0	161450	161450
4	Bihar	0	208540	208540	0	240400	240400
5	Goa	88809	3240	92049	66550	3368	69918
6	Gujarat	745706	70798	816504	650829	50774	701603
7	Haryana	0	32050	32050	0	34568	34568
8	Himachal Pradesh	0	6685	6685	0	7215	7215
9	Jammu & Kashmir	0	18530	18530	0	18850	18850
10	Karnataka	189859	95275	285134	128415	121196	249611
11	Kerala	526342	57514	583856	593783	78039	671822
12	Madhya Pradesh	0	115161	115161	0	47457	47457
13	Maharashtra	453000	127000	580000	414268	122785	537053
14	Manipur	0	13700	13700	0	16450	16450
15	Meghalaya	0	3085	3085	0	4968	4968
16	Mizoram	0	2700	2700	0	3147	3147
17	Nagaland	0	3700	3700	0	5200	5200
18	Odisha	156081	153428	309509	113893	168056	281949
19	Punjab	0	36000	36000	0	58000	58000
20	Rajasthan	0	15100	15100	0	14269	14269
21	Sikkim	0	140	140	0	140	140
22	Tamil Nadu	355100	109500	464600	370998	114000	484998
23	Tripura	0	27906	27906	0	29450	29450
24	Uttar Pradesh	0	160017	160017	0	225371	225371
25	West Bengal	164000	786020	950020	184300	915800	1100100
26	A & N Islands	27225	40	27265	27021	61	27082
27	Chandigarh	0	4	4	0	44	44
28	Dadar & Nagar Haveli	0	15	15	0	55	55
29	Daman & Diu	18807	0	18807	21524	0	21524
30	Delhi	0	4200	4200	0	3200	3200
31	Lakshadweep	10550	0	10550	13650	0	13650
32	Pondicherry	38420	4104	42524	39600	4900	44500
33	Chattisgarh	0	0	0	0	95763	95763
34	Uttranchal	0	0	0	0	6422	6422
35	Jharkhand	0	0	0	0	101000	101000
Total		2920444	2438028	5358472	2829771	3126163	5955934

Continued..

Source : Department of Animal Husbandry and Dairying, Ministry of Agriculture

Table 3.12.3 : State-wise fish production

Sl. No.	States/UT's	2003-2004			2004-2005		
		Marine	Inland	Total	Marine	Inland	Total
1	2	6	7	8	9	10	11
1	Andhra Pradesh	263930	680710	944640	210733	642321	853054
2	Arunachal Pradesh	0	2650	2650	0	2704	2704
3	Assam	0	181000	181000	0	186314	186314
4	Bihar	0	266490	266490	0	267510	267510
5	Goa	83760	3600	87360	94813	4231	99044
6	Gujarat	609140	45480	654620	584779	50426	635205
7	Haryana	0	39130	39130	0	42050	42050
8	Himachal Pradesh	0	6530	6530	0	6901	6901
9	Jammu & Kashmir	0	19750	19750	0	19100	19100
10	Karnataka	187000	70000	257000	171227	80000	251227
11	Kerala	608520	76180	684700	601863	76451	678314
12	Madhya Pradesh	0	50820	50820	0	62060	62060
13	Maharashtra	420010	125120	545130	417769	130250	548019
14	Manipur	0	17600	17600	0	17800	17800
15	Meghalaya	0	5150	5150	0	5638	5638
16	Mizoram	0	3380	3380	0	3680	3680
17	Nagaland	0	5560	5560	0	4900	4900
18	Odisha	116880	190020	306900	121928	193657	315585
19	Punjab	0	83650	83650	0	77700	77700
20	Rajasthan	0	14300	14300	0	16391	16391
21	Sikkim	0	140	140	0	140	140
22	Tamil Nadu	373000	101140	474140	307693	151734	459427
23	Tripura	0	17980	17980	0	19838	19838
24	Uttar Pradesh	0	267000	267000	0	277074	277074
25	West Bengal	181600	988000	1169600	179500	1035500	1215000
26	A & N Islands	31060	90	31150	32600	83	32683
27	Chandigarh	0	80	80	0	84	84
28	Dadar & Nagar Haveli	0	50	50	0	48	48
29	Daman & Diu	13770	0	13770	12506	0	12506
30	Delhi		2100	2100	0	1410	1410
31	Lakshadweep	10030	0	10030	11964	0	11964
32	Pondicherry	42800	5200	48000	31500	5250	36750
33	Chattisgarh	0	111050	111050	0	120072	120072
34	Uttranchal	0	2560	2560	0	2566	2566
35	Jharkhand	0	75380	75380	0	22000	22000
Total		2941500	3457890	6399390	2778875	3525883	6304758

Continued..

Source : Department of Animal Husbandry and Dairying, Ministry of Agriculture

**Table 3.12.3 : State-wise fish production
(Tonnes)**

Sl. No.	States/UT's	2005-2006			2006-2007		
		Marine	Inland	Total	Marine	Inland	Total
1	2	12	13	14	15	16	17
1	Andhra Pradesh	21884	67225	89109	240.20	616.73	856.93
2	Arunachal Pradesh	0	275	275	0.00	2.77	2.77
3	Assam	0	18801	18801	0.00	181.48	181.48
4	Bihar	0	27953	27953	0.00	267.04	267.04
5	Goa	10091	404	10495	98.96	3.43	102.39
6	Gujarat	66388	6993	73381	670.51	76.82	747.33
7	Haryana	0	4820	4820	0.00	60.08	60.08
8	Himachal Pradesh	0	730	730	0.00	6.89	6.89
9	Jammu & Kashmir	0	1915	1915	0.00	19.20	19.20
10	Karnataka	17697	12060	29757	168.54	123.92	292.46
11	Kerala	55891	7798	63689	598.06	79.57	677.63
12	Madhya Pradesh	0	6108	6108	0.00	65.04	65.04
13	Maharashtra	44534	13520	58054	464.09	131.85	595.94
14	Manipur	0	1822	1822	0.00	18.61	18.61
15	Meghalaya	0	412	412	0.00	5.49	5.49
16	Mizoram	0	375	375	0.00	3.76	3.76
17	Nagaland	0	550	550	0.00	5.80	5.80
18	Odisha	12221	20324	32545	128.14	213.90	342.04
19	Punjab	0	8564	8564	0.00	86.70	86.70
20	Rajasthan	0	1850	1850	0.00	22.20	22.20
21	Sikkim	0	15	15	0.00	0.15	0.15
22	Tamil Nadu	30799	15504	46303	387.25	155.03	542.28
23	Tripura	0	2387	2387	0.00	28.63	28.63
24	Uttar Pradesh	0	28958	28958	0.00	306.73	306.73
25	West Bengal	16000	109000	125000	178.10	1181.00	1359.10
26	A & N Islands	1205	5	1210	28.60	0.08	28.68
27	Chandigarh	0	9	9	0.00	0.17	0.17
28	Dadar & Nagar Haveli	0	5	5	0.00	0.05	0.05
29	Daman & Diu	1772	7	1779	16.35	0.06	16.41
30	Delhi	0	70	70	0.00	0.61	0.61
31	Lakshadweep	1196	0	1196	11.75	0.00	11.75
32	Pondicherry	1927	218	2145	33.61	6.05	39.66
33	Chattisgarh	0	13175	13175	0.00	137.75	137.75
34	Uttranchal	0	279	279	0.00	3.03	3.03
35	Jharkhand	0	3427	3427	0.00	34.27	34.27
Total		281605	375558	657163	3024.16	3844.89	6869.05

Continued..

Source : Department of Animal Husbandry and Dairying, Ministry of Agriculture

Table 3.12.3 : State-wise fish production

Sl. No.	States/UT's	2007-2008			2008-2009		
		Marine	Inland	Total	Marine	Inland	Total
1	2	18	19	20	21	22	23
1	Andhra Pradesh	254892	755195	1010087	291159	961618	1252777
2	Arunachal Pradesh	0	2830	2830	0	2880	2880
3	Assam	0	190320	190320	0	206150	206150
4	Bihar	0	319100	319100	0	300650	300650
5	Goa	32262	1166	33428	83136	3078	86214
6	Gujarat	644531	77376	721907	623055	142847	765902
7	Haryana	0	67236	67236	0	76285	76285
8	Himachal Pradesh	0	7851	7851	0	7793	7793
9	Jammu & Kashmir	0	17330	17330	0	19270	19270
10	Karnataka	175566	122124	297690	218137	143717	361854
11	Kerala	586286	81041	667327	583150	102842	685992
12	Madhya Pradesh	0	63893	63893	0	68466	68466
13	Maharashtra	419815	136632	556447	395963	127138	523101
14	Manipur	0	18600	18600	0	18800	18800
15	Meghalaya	0	4000	4000	0	3959	3959
16	Mizoram	0	3760	3760	0	2891	2891
17	Nagaland	0	5800	5800	0	6175	6175
18	Odisha	130767	218716	349483	135487	239335	374822
19	Punjab	0	78730	78730	0	86207	86207
20	Rajasthan	0	25700	25700	0	24100	24100
21	Sikkim	0	175	175	0	168	168
22	Tamil Nadu	393266	166090	559356	365280	168885	534165
23	Tripura	0	36245	36245	0	36000	36000
24	Uttar Pradesh	0	325950	325950	0	349274	349274
25	West Bengal	182735	1264527	1447262	189290	1294710	1484000
26	A & N Islands	28600	85	28685	32335	157	32492
27	Chandigarh	0	214	214	0	244	244
28	Dadar & Nagar Haveli	0	48	48	0	50	50
29	Daman & Diu	26280	78	26358	14060	81	14141
30	Delhi	0	610	610	0	715	715
31	Lakshadweep	11042	0	11042	12592	0	12592
32	Pondicherry	33444	5569	39013	34550	5750	40300
33	Chattisgarh	0	139373	139373	0	158698	158698
34	Uttranchal	0	3092	3092	0	3163	3163
35	Jharkhand	0	67890	67890	0	75800	75800
Total		2919486	4207346	7126832	2978194	4637896	7616090

Continued..

Source : Department of Animal Husbandary and Dairying, Ministry of Agriculture

Table 3.12.3 : State-wise fish production

concluded

Sl. No.	States/UT's	2009-2010		
		Marine	Inland	Total
1	2	24	25	26
1	Andhra Pradesh	293151	1000704	1293855
2	Arunachal Pradesh	0	2650	2650
3	Assam	0	218822	218822
4	Bihar	0	297400	297400
5	Goa	81927	3437	85364
6	Gujarat	687445	84071	771516
7	Haryana	0	100464	100464
8	Himachal Pradesh	0	7847	7847
9	Jammu & Kashmir	0	19300	19300
10	Karnataka	170992	237061	408053
11	Kerala	570013	93108	663121
12	Madhya Pradesh	0	66119	66119
13	Maharashtra	415767	122587	538354
14	Manipur	0	19200	19200
15	Meghalaya	0	4210	4210
16	Mizoram	0	3042	3042
17	Nagaland	0	6360	6360
18	Odisha	129332	241208	370540
19	Punjab	0	122860	122860
20	Rajasthan	0	26908	26908
21	Sikkim	0	168	168
22	Tamil Nadu	365280	168885	534165
23	Tripura	0	42268	42268
24	Uttar Pradesh	0	392926	392926
25	West Bengal	179004	1325996	1505000
26	A & N Islands	33000	159	33159
27	Chandigarh	0	236	236
28	Dadar & Nagar Haveli	0	50	50
29	Daman & Diu	15880		15880
30	Delhi	0	715	715
31	Lakshadweep	12372	0	12372
32	Pondicherry	36100	5849	41949
33	Chattisgarh	0	174245	174245
34	Uttranchal	0	3488	3488
35	Jharkhand	0	70500	70500
Total		2990263	4862843	7853106

concluded

Source : Department of Animal Husbandary and Dairying, Ministry of Agriculture

The State wise fish production data is available in table 3.12.3

3.12.3 The inland fishery water resources contributes to the Country's fish production in a significant manner. The table 3.12.4. presents the details of Inland water resources of water.

Table 3.12.4 : Inland fishery water resources of India

Sl. No.	State/UTs	Rivers & Canals (Kms.)	Reservoirs (Lakh Ha)	Tanks & Ponds (Lakh Ha)	Floodplain Lakes & Derelict Water (Lakh Ha)	Brackish Water (Lakh Ha)
1	2	3	4	5	6	7
1	Andhra Pradesh	11,514	2.34	5.17	-	0.60
2	Arunachal Pradesh	2,000	-	2.76	0.42	-
3	Assam	4,820	0.02	0.23	1.10	-
4	Bihar	3,200	0.60	0.95	0.50	-
5	Chhattisgarh	3,573	0.84	0.63	-	1.47
6	Goa	250	0.03	0.03	-	Neg
7	Gujarat	3,865	2.43	0.71	0.12	1.00
8	Haryana	5,000	0.09	0.10	0.10	-
9	Himachal Pradesh	3,000	0.42	0.01	-	-
10	Jammu & Kashmir	27,781	0.07	0.17	0.06	-
11	Jharkhand	4,200	0.94	0.29	-	-
12	Karnataka	9,000	4.40	2.90	-	0.10
13	Kerala	3,092	0.30	0.30	2.43	2.40
14	Madhya Pradesh	17,088	2.27	0.60	-	-
15	Maharashtra	16,000	2.79	0.59	-	0.10
16	Manipur	3,360	0.01	0.05	0.04	-
17	Meghalaya	5,600	0.08	0.02	Neg	-
18	Mizoram	1,395	-	0.02	-	-
19	Nagaland	1,600	0.17	0.50	Neg	-
20	Odisha	4,500	2.56	1.14	1.80	4.30
21	Punjab	15,270	Neg	0.07	-	-
22	Rajasthan	5,290	1.20	1.80	-	-
23	Sikkim	900	-	-	0.03	-
24	Tamil Nadu	7,420	5.70	0.56	0.07	0.60
25	Tripura	1,200	0.05	0.13	-	-
26	Uttar Pradesh	28,500	1.38	1.61	1.33	-
27	Uttarakhand	2,686	0.20	0.01	0.00	-
28	West Bengal	2,526	0.17	2.76	0.42	2.10
29	Andaman & Nicobar Islands	115	0.01	0.03	-	1.20
30	Chandigarh	2	-	Neg	Neg	-
31	Dadra & Nagar Haveli	54	0.05	-	-	-
32	Daman & Diu	12	-	Neg	-	Neg
33	Delhi	150	0.04	-	-	-
34	Lakshadweep	-	-	-	-	-
35	Puducherry	247	-	Neg	0.01	Neg
Total		195,210	29.07	24.14	7.98	12.40

Source: Annual Report 2011-12, Department of Animal Husbandry and Dairying, Ministry of Agriculture
Neg - Negligible

3.12.4 Though, the livestock population in the country is increasing over the years, the incidence of livestock and poultry diseases are also increasing which has causes in environmental changes and serious impacts on environmental balance. **Table 3.12.5 at gives a summary of the incidence of various livestock and poultry diseases in 2010**

Table 3.12.5: Incidence of livestock and poultry diseases in India

(Jan-Dec.,2011)

SI. No.	Disease Name	Species	Number of		
			Outbreak	Attack	Death
1	Foot and mouth disease	Bovine	653	10959	207
		Buffalo	8	1358	11
		Ovine/Caprine	31	485	0
		Swine	9	45	0
		Canine	0	0	0
	Total	701	12847	218	
2	Hamorrhagic septicaemia	Bovine	172	1807	466
		Ovine/Caprine	14	265	100
		Buffalo	129	846	246
		Swine	0	0	0
		Total	315	2918	812
3	Black quarter	Bovine	412	2605	875
		Ovine/Caprine	4	25	1
		Buffalo	1	46	24
		Total	417	2676	900
4	Anthrax	Bovine	33	165	165
		Ovine/Caprine	15	197	158
		Buffalo	0	0	0
		Total	48	362	323
5	Fascioliasis	Bovine	195	509195	31
		Ovine/Caprine	5	51	7
		Cannine	2	10	0
		Swine	0	1	0
		Buffalo	32	1755	10
		Equine	0	4	0
		Total	234	511016	48
6	Enterotoxaemia	Ovine/Caprine	67	866	242
		Bovine	4	250	0
		Total	71	1116	242
7	Sheep pox and goat pox	Ovine/Caprine	197	3861	698
8	Blue Tongue	Ovi/Cap	38	2212	136
9	CCPP	Ovi/Cap	1	22	5
10	Amphistomiasis	Bovine	132	14996	29
11	Swine Fever	Swine	284	4018	1371
12	Salmonellosis	Avian	123	113451	4439
		Bovine	1	3002	207
		Swine	0	0	0
		Canine	0	0	0
		Total	124	116453	4646
13	Coccidiosis	Bovine	81	15194	739
		Ovi/Cap	7	18	0
		Avian	635	168693	25262
		Swine	14	70	0
		Buffalo	0	3	0
		Cannine	1	1	0
		Total	738	183979	26001

Table 3.12.5: Incidence of livestock and poultry diseases in India

(Jan-Dec.,2011)

Sl. No.	Disease Name	Species	Number of		
			Outbreak	Attack	Death
14	Ranikhet (New Castle) Disease	Avian	886	240438	24016
15	Fowl Pox	Avian	235	19122	1682
16	Fowl cholera	Avian	143	7999	2276
17	Marks Disease	Avian	1	100	50
18	I.B.D.	Avian	338	86381	24199
19	Duck Plague	Avian	87	2232	497
20	Chronic respiratory disease	Avian	291	133808	59642
21	Canine Disemper	Canine	100	1509	123
22	Rabies	Bovine	56	168	168
		Canine	23	163	163
		Buffalo	9	75	75
		Ovi/Caprine	3	8	8
		Avian	1	3	3
	Total	92	417	417	
23	Babesiosis	Bovine	120	3177	22
		Buffalo	6	282	3
		Equine	2	6	0
		Canine	3	13	0
		Total	131	3478	25
24	Mastitis	Bovine	186	9072	2
		Ovi/Caprine	1	17	0
	Total	187	9089	2	
25	Trypanismiasis	Bovine	84	1334	16
		Canine	1	1	0
		Equine	1	171	7
		Buffalo	91	1922	23
		Total	177	3428	46
26	Mange	Bovine	43	541	0
		Ovi/Caprine	40	1739	0
		Swine	14	321	0
		Canine	7	246	0
		Total	104	2847	0
27	Peste Des Petits Ruminants(PPR)	Ovine/Caprine	197	6976	1707
28	Anaplasmosis	Bovine	27	90	9
29	Brucellosis	Bovine	1	1	0
		Buffalo	1	16	0
		Total	2	17	0
30	Coryza	Avian	8	37505	37
31	Avian Influenza (HPAI)	Avian	4	6299	4863
		Fau	1	1143	1143
			5	7442	6006
		Total			
32	Glanders	Equine	3	3	2

Source: Annual Report-2011-12, Department of Animal Husbandry and Dairying, Ministry of Agriculture

* Figure pertains to number of poultry destroyed.

1702 samples tested out of which 23 found positive and destroyed

+ Figure pertains to number of animals destroyed

\$ Total does not include animals attacked by Glander disease

** The total does not include poultry destroyed due to HPAI and equine destroyed due to Glander disease.